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Dr. James Muirhead Said in His *Land of Contrasts* "the American Possesses a Marked Alertness of Mind and a Manifold Interest; Above All an Inextinguishable Hope and Courage." Just Now Pessimism Is Fashionable, but That Mood Will Pass.

Vol. XXII, No. 3 MARCH, 1933

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

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THE 81st ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN MADISON, WISCONSIN, AUGUST 28 TO SEPTEMBER 2, 1933, HOTEL LORAINE, HEADQUARTERS, EMERSON STANLEY, 602 CENTRAL BUILDING, MADISON, LOCAL SECRETARY.

The 1933 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Madison.

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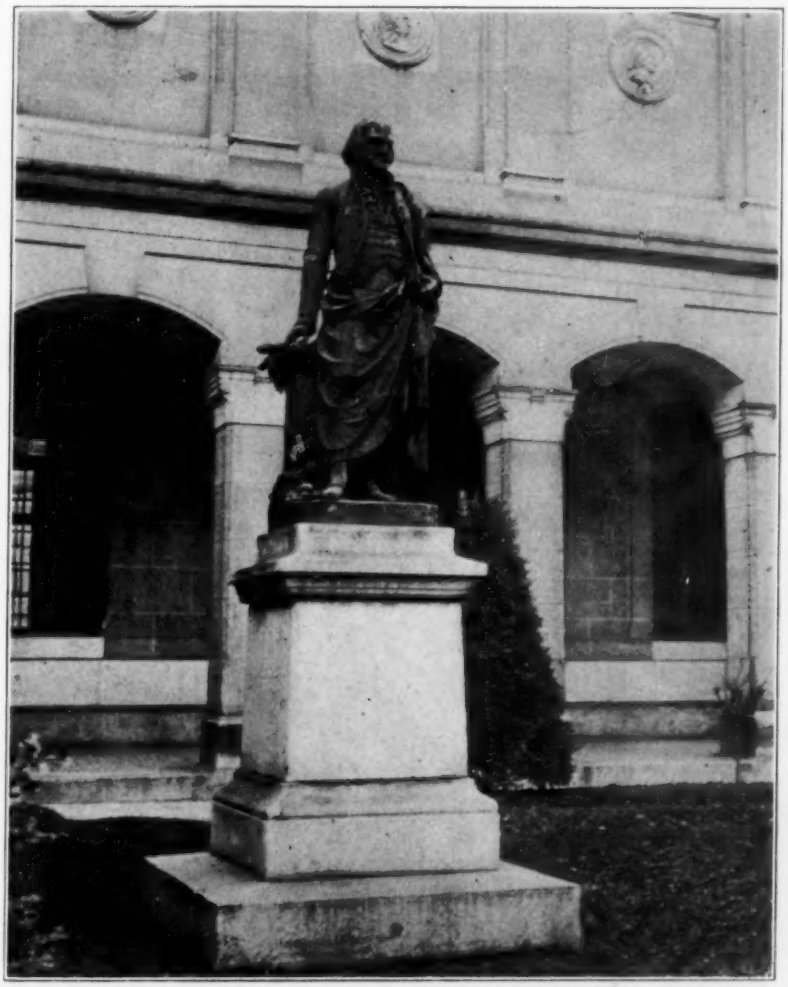
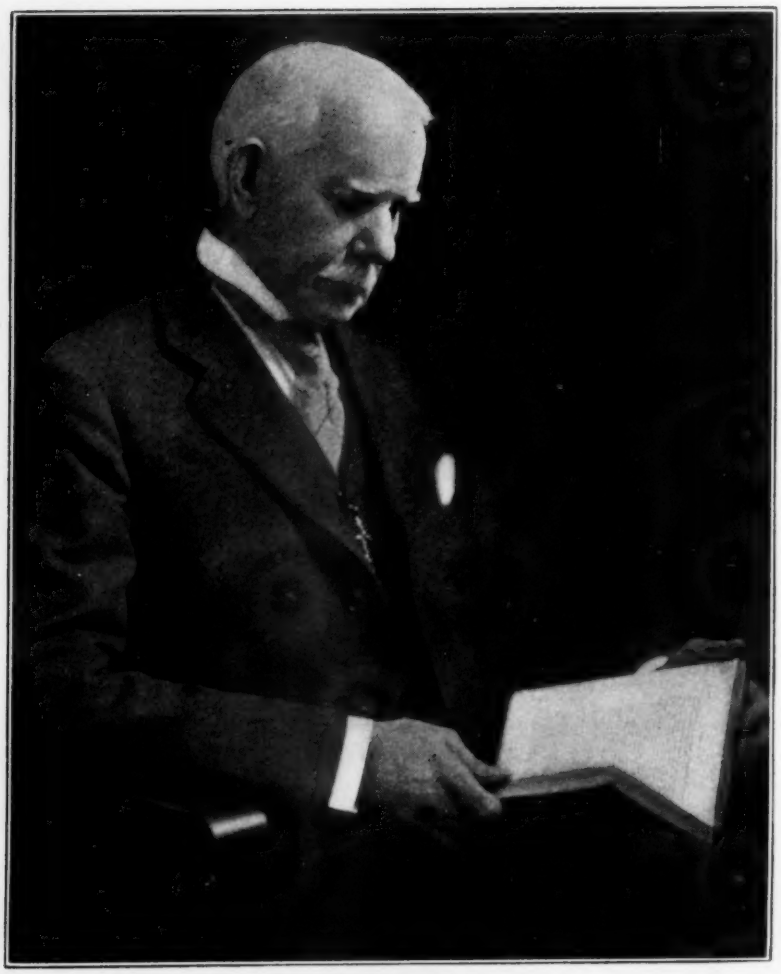


ANTOINE AUGUSTIN PARMENTIER—Pharmacist.—He contributed largely to the organization of the pharmaceutical service in the French Army—See April JOURNAL, 1932, page 319. The statue is in front of the Paris School of Pharmacy.



DR. D. M. R. CULBRETH.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXII MARCH, 1933 No. 3

DAVID M. R. CULBRETH.

This is the 50th anniversary of David Marvel Reynolds Culbreth as member of the AMERICAN PHARMACEUTICAL ASSOCIATION. He was born at Golden Ridge, Delaware, December 4, 1855, the son of Robert Baynard and Sarah Gilder (Reynolds); was educated in the public schools of Delaware and in Felton Seminary and, thereafter, at the University of Virginia. He graduated from the Maryland College of Pharmacy (now the School of Pharmacy, University of Maryland) winning three of the prizes and was elected president of the graduating class. In 1885, Dr. Culbreth graduated from the College of Physicians and Surgeons, Baltimore.

He is a member of the American Academy of Medicine, Maryland Academy of Science, American Association for the Advancement of Science, Maryland Pharmaceutical Association, various fraternal organizations, the University Club, etc.

For many years the subject of this brief sketch was engaged in retail pharmacy at the corner of Eager and Charles Streets, Baltimore, and Commissioner of Pharmacy and Practical Chemistry during the terms of Governors Jackson, Brown and Lowndes.

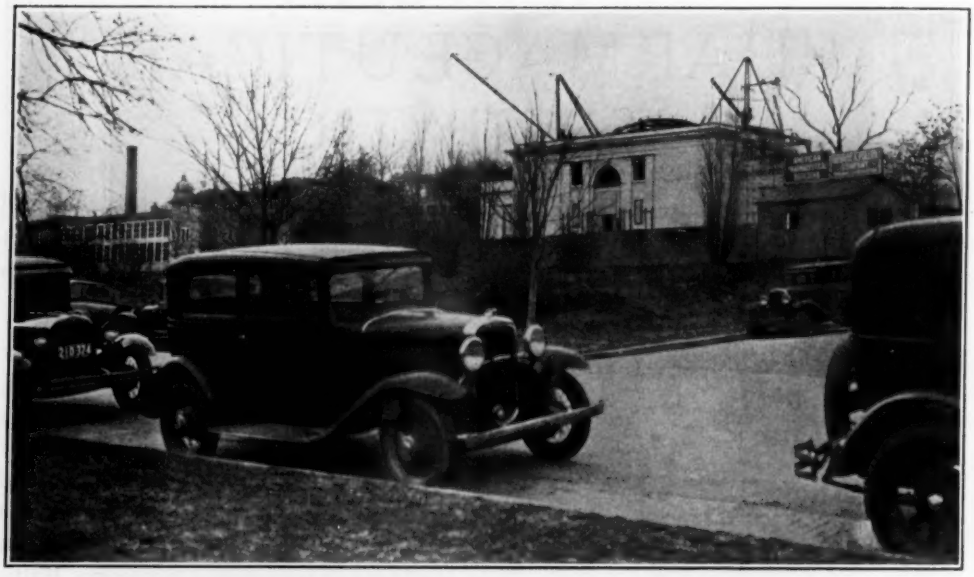
Dr. Culbreth was professor of Botany, Materia Medica and Pharmacognosy of the faculty of the Maryland College of Pharmacy, 1885–1920, and of the University of Maryland 1897–1920.

He was author of "Pharmaceutical Botany," 1892, 1905, 1910, 1915, 1924: "Materia Medica and Pharmacology," 1896, 1900, 1903, 1906, 1917, 1927; "Materia Medica Compend," 1905. He also wrote "University of Virginia—Memories of Student Life and Professors." Among articles of later years appearing in the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION are: "Reminiscences of Early Pharmacy in Baltimore," published in the March number, 1930, pages 282–288, and "Ex-presidents of the AMERICAN PHARMACEUTICAL ASSOCIATION from Baltimore as I Remember Them," March JOURNAL, 1931, pages 246–252. Recognizing his observance of the traits and qualities of others in these articles one could apply his rules to him in drawing a pen picture—thoughtful in speech and considerate of others.

April 26, 1894, Dr. Culbreth married Elizabeth Gardner; his second marriage, to Helen Graeme Taylor, took place on December 20, 1919.

Hopeful wishes for good health are extended to Dr. and Mrs. Culbreth.

PHARMACY'S BUILDING IS NEARING COMPLETION.



Another view of the Pharmacy Headquarters Building, showing the structure under roof and its location in line with the Capitol.

On top of the Pharmacy Headquarters Building. This view shows the proximity of the building to Lincoln Memorial. Daughter of Treasurer Charles W. Holton and Secretary E. F. Kelly are taking in the situation.

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase Street, BALTIMORE, MD.

THE RELATIONSHIP OF PHARMACY TO PUBLIC HEALTH.

THE deposition of Dr. Virgil E. Simpson,[1] in a case in Court of the Kentucky Board of Pharmacy, has an interesting bearing on the relationship of pharmacy in public health. He stated that pharmacy was one of the learned professions —a very essential part of the practice of medicine. He stressed the importance of the pharmacist's training and education in the preparation of medicines for properly exhibiting a drug so that the physician may obtain the desired results and safeguard the patient, and that his service protects the public from the dangers of unwise use of drugs.

Dr. Robert P. Fischelis, on the occasion of the award of certificates to registrants in New Jersey, said: "when an individual becomes a member of a profession, he ceases to be an individual as far as his public acts are concerned. He becomes a member of a class which is judged by the experience of the public with that class."

In addressing New Jersey Board of Pharmacy registrants, to whom Governor A. Harry Moore presented certificates, Dr. Robert L. Swain emphasized the relation of pharmacy to public health in these words—"Pharmacy must be seen as a service, as a public function, as an essential public health agency, as one making an unending contribution to the public welfare."

The Committee on the Costs of Medical Care urged in Recommendation 5 that pharmaceutical education place more stress on the pharmacists' responsibilities and opportunities for public service.

Dean Frederick J. Wulling in addressing the Lyon-Lincoln Counties (Minnesota) Medical Association said: "Physicians and pharmacists exist not for themselves but for the public welfare, and their aims and aspirations are all directed unselfishly and altruistically toward that end. These facts must be kept clearly in mind before they assure the realization, which not all physicians have as yet, of the necessity of much united and concerted work toward public health. The two professions should coöperate more willingly and effectively. They already do in a very respectable measure, but the coöperation should become much more general for the best results."

A resolution now before the Council of the AMERICAN PHARMACEUTICAL ASSOCIATION speaks of the responsibilities of pharmacy in relation to public health in the quoted paragraph and also for the watchfulness of pharmacists in matters that affect the public. The action was responsive to proposed legislation in which it was suggested that alcoholic malt beverages might be distributed through drug stores.[2]

"WHEREAS, the distribution of alcoholic malt beverages in drug stores would be most inappropriate because it would be contrary to the essential purpose and

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[1] Dr. Simpson has practiced medicine for more than a quarter of a century, is a member of the Revision Committee of the United States Pharmacopœia and professor of medicine, University of Louisville.

[2] See Council Letter No. 7, this issue of the JOURNAL.

important responsibilities of pharmacy in relation to the people and to public health, and because, through such distribution, an activity foreign to its purposes and ethics would be introduced."

CALIFORNIA'S APPALLING DISASTER.

THE world sympathizes with Southern California, because of the recent seismic disturbance, which resulted in the loss of more than one hundred lives, injuries to several thousand of its citizens, and property loss mounting up to many millions of dollars. As citizens, the members of the AMERICAN PHARMACEUTICAL ASSOCIATION extend their sympathy in the great loss and trials, and to those of the drug-trade activities who are sharing in the suffering and financial distress it expresses hope for early recovery.

The courage exhibited by the people of San Francisco after its experience in 1906 gives assurance that the citizens of Southern California will meet their affliction with fortitude and hopefulness. The rapid restoration in San Francisco astonished the people of other sections; within a very few years the city was restored and assumed even a greater prominence in the affairs of state and country than before the fire.

It was this writer's duty, in 1909, to preside at the Los Angeles meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION, because of the serious illness of President Oscar Oldberg. He recalls with appreciation the many courtesies extended in the beautiful "City of the Angels." A delicate touch of sentiment was lent to the California welcome accorded when a committee of ladies and gentlemen met the incoming visitors twenty miles out from Los Angeles in the midst of orange-groves and almond-orchards, with not only words of greeting, but gifts of fruits and flowers.

The situation of the present intensifies that occasioned by the earthquake, by the destruction and misery that accompanies such disasters. The country pauses to sympathize with Southern California and is hopeful that the courage which characterizes its people will abide with them during the restoration period. Those who are suffering will find little comfort in discussing the cause of the disturbances that upset the earth's equilibrium, as delicately poised as the pharmacist's weights and drugs on a prescription or analytical balance. Our hope is that misery may be relieved and financial burdens lightened.

BETTER CONDITIONS ARE FOUNDED ON YESTERDAY'S EXPERIENCES.

THIS comment is founded on hope and encouragement to give determined support to the efforts being made to restore confidence. It seems to be an easy matter to come to a decision as to who should make such a change possible, but suggestions as to how this can be brought about presents the great difficulty.

Selfishness has been most influential in developing the conditions complained of—greed, disregard of fairness, honorable methods and questionable means for

acquiring wealth; if improvement is to be expected there must be greater courage to do right and discouragement of means and methods which destroy confidence.

John Grier Hibben, former president of Princeton University, said (in *Forum*, condensed in *Reader's Digest*) "we are not merely passive observers of a stupendous national drama. Our destiny is certainly not independent of our resourcefulness or of our character. As we look back over history it is evident that our progress has been due to the fact that there were men and women in every generation who believed in something higher than themselves. Not only were they courageous in expressing their convictions, but their lives measured up to their faith."

If changes for the better come, as all of us hope, we must be prepared to make use of and apply them rightly or, if betterment is long deferred, it will require great courage to hold up under our disappointment.

In more recent years there seems to have been an under-valuation of essential attributes and qualities—honesty, purpose, conscience, duty and responsibility—because they interfered with selfish desires. The shock received within the past month may bring about an awakening to a realization that they are fundamental to individual and national life. Seemingly there is in all lines a degree of weakness—a lack of courage to do the right, which freezes the assets that characterize a useful citizen—trust, confidence and enthusiasm are essential qualities, without them progressive sense atrophies; periods of prosperity seem to develop a spirit of covetousness. We must recreate greater confidence in government, in industry and commerce and the individual needs to strengthen confidence in ourselves for "he who has not confidence in himself cannot have confidence in his fellow men. When he ceases to believe in his ability to find opportunity, he has lost most, if not all, of his belief in the existence of opportunity."

President Roosevelt asserts that our leaders must have vision and act speedily. Those who are leaders in commerce and industry, in the professions and arts, in state and civic affairs, in the courts, church and educational institutions must be wise and vigorous and have courage to do the right, so that we may be freed from the incubus of depression and become normal once more. Yesterday's experiences unfold to us a knowledge of how to better our conditions.

PHARMACEUTICAL SERVICE IN EUROPEAN ARMIES.

The Indian and Eastern Druggist published a report from the *Bulletin*[1] of the International Pharmaceutical Federation on the position of pharmaceutical service in the armies of twenty-four European countries. The report shows that the principle of a pharmaceutical corps has been adopted even by neutral countries like Switzerland, which have only a militia, and, with the exception of Great Britain, all those countries which took part in the last war and have retained a standing army have developed their pharmacy corps. This is put forward as a proof that the pharmacists who were mobilized (at the front or in reserve) were of great value, either in the permanent pharmaceutical service or as immediate collaborators of the medical corps. The work of pharmacists in the branches of hygiene, disinfection, and biological analysis is recognized to have been invaluable. Further, in numerous countries they were entrusted with the supervision of the food supplies used in the Army, and with the upkeep of sanitary equipment.

[1] See JOUR. A. PH. A., June 1930, page 653, and September JOURNAL, 1930, page 1026.

SCIENTIFIC SECTION

BOARD OF REVIEW ON PAPERS.—*Chairman*, L. W. Rowe; John C. Krantz, Jr.; F. J. Bacon.

A METAL EXTRACTION APPARATUS FOR PHYTOCHEMICAL WORK.

BY. A. F. SIEVERS.*

In connection with studies on plants yielding essential oils, fixed oils and drugs, the Division of Drug and Related Plants of the U. S. Department of Agriculture required an apparatus that would permit the extraction of considerable quantitites of material with petroleum ether. No apparatus entirely meeting the requirements is available from dealers in laboratory supplies and scientific equipment, therefore it was necessary to design such and have it constructed in the Department Shops. A general idea of the type of apparatus desired was suggested by that described by Bryant[1] of the Ontario Agricultural Experiment Station. Certain modifications were necessary, however. A tubular condenser was preferred and a steam-jacketed receiver was considered essential. The apparatus finally constructed proved to be so generally satisfactory that its detailed description may be of interest to research workers who are required to extract relatively large quantitities of plant material.

Fig. 1.—Extraction apparatus for phytochemical work.

All the main parts of the apparatus are constructed of tin-lined copper weighing 32 ounces to the square foot. The illustration and detailed description here given should enable those interested to prepare working drawings by means of which the apparatus can be constructed by sheet metal workers.

Extraction Chamber.—This is 20 inches high and 10 inches in diameter with a total capacity of 6.8 gallons or about 6 gallons up to the line to which it may be filled. Around the top edge is a stout brass flange $2^1/_2$ inches wide and $^1/_8$ inch thick, to which is fitted the condenser which is provided with a similar flange at its base. A tight seal is obtained by means of a pressed cork gasket of the same shape and width as the flanges and $^1/_8$ inch thick. The condenser is secured by 12 threaded brass screws with wing nuts screwed upward through the lower flange which fit into corresponding

* Bureau of Plant Industry, U. S. Department of Agriculture.

[1] L. R. Bryant, *Industrial and Engineering Chemistry, Analytical Edition* (July 15, 1929), page 139.

but unthreaded holes in the upper flange. By this means removal of the condenser is quickly accomplished. The chamber is reduced at the base by means of an inverted cone to a diameter of 4 inches to which is attached a cylindrical extension $4^1/_2$ inches long, fitted at the base with a brass flange $1^1/_4$ inches wide and $^1/_8$ inch thick. To this is attached the receiver fitted at the neck with a similar flange, the seal being secured by means of a cork gasket and 6 brass screws. A perforated, tinned brass plate is fitted as a false bottom at the base of the chamber just above the cone and a solid plate at the base of the inverted cone forms the bottom of the chamber.

Extending upward from near the top of the cylindrical extension between the extraction chamber and the receiver to a point just below the condenser connection is a tin-lined copper tube, one inch in diameter, to carry the solvent vapors from the receiver to the upper part of the apparatus. This tube has no joints or elbows but is bent into the desired shape and has soldered connections, thus eliminating possible leaks. On the opposite side of the chamber is a glass gage of $^5/_8$ inch outside diameter. The siphon consists of a single piece of block tin tubing $^3/_{16}$ inch inside diameter with soldered connections. A draw-off cock (not shown) at the base of the chamber on the side opposite to the siphon provides for draining the chamber. A cotton bag slightly smaller than the extraction chamber was used in this case for holding the charge. Other receptacles may be used in accordance with the nature of the material to be extracted.

Condenser.—The condenser is a highly efficient tubular type. It consists of a vertical cylinder 18 inches high and 4 inches in diameter containing 33 evenly distributed, tin-lined, copper tubes $^3/_8$ inch in diameter. The condensed solvent flows freely from these vertical tubes without obstruction by the ascending vapors as is frequently the case when a worm condenser is used, especially with a low boiling solvent like petroleum ether. A tubular condenser such as described weighs less than the usual worm type when in use because it holds less water and is on the whole somewhat easier to handle.

Receiver.—The receiving vessel is constructed of the same material as the extraction chamber and is 10 inches in diameter and 15 inches high. It is reduced at the top to an opening of 4 inches by means of a cone to which is attached a short collar fitted with the brass flange, already referred to, by which the receiver is attached to the extraction chamber.

As this apparatus was primarily intended for extraction with low boiling, flammable solvents, the receiver is enclosed with a jacket extending around and under the vessel with a space of 1 inch between the walls and bottoms. To volatilize the solvent steam is introduced into this jacket near the top, there being an outlet at the bottom on the opposite side (not shown). The cock for drawing off the concentrated extract is shown at the base. It connects with the bottom of the receiver. In the cone top of the receiver is a 1-inch collared opening (not shown) through which the receiver may be filled without disconnecting it and in which a thermometer may be fitted.

The apparatus described should be exceedingly useful in general research work which requires the extraction of considerable quantities of material, especially with low-boiling, flammable solvents such as ether or petroleum ether. Experience has shown that it can be operated without leakage of solvent at any point but it is advisable to attach a tube to the top of the condenser to conduct to a convenient flue or window those traces of very low boiling fractions of the solvents mentioned that usually cannot be condensed. It is believed also that this apparatus would be most useful in phytochemical laboratories where the extraction by students of bulky plant material with flammable solvents involves considerable fire risk unless the escape of solvent from the apparatus is eliminated.

In addition to its use as an extractor the apparatus may also be conveniently used as a still for concentrating extracts and for fractioning solvents such as petroleum ether, the extraction chamber serving as the receiver in such cases. The immediate purpose for which the apparatus here described was intended was for the extraction of absolute essence of rose from roses. It was very satisfactory for this purpose but the rose "concrete" thus obtained, consisting of waxes and essential

oil, is present in small amounts, is readily soluble in petroleum ether and does not require long contact with the solvent nor frequent changes of fresh solvent. It was found, therefore, that much larger quantitities of roses could be handled in a given time by extracting these in five-gallon milk cans by maceration with several subsequent washings and using the apparatus for concentrating the extract. It is expected, however, that it will prove most useful in the usual way in the extraction of botanical drugs, oil seeds, oleoresins, etc., where continuous percolation with fresh solvent is desired.

AMMI VISNAGA.*

BY F. A. UPSHER SMITH, PH.C. (GT. BRIT.).

A PRELIMINARY REPORT.

The fruits of *Ammi visnaga* have been used in Egypt to relieve spasms of the ureter and for the removal of calculi. The author visited Cairo for the purpose of investigating this drug, and now submits a preliminary report with a complete bibliography showing what is known to date as to the pharmacognosy, pharmacology, therapy, pharmacy and chemistry of the drug, which is commonly known as *Khella*.

Most of the information that I have so far gathered is due to Dr. Karam Samaan, professor in the Department of Pharmacology in the University of Cairo. During the three weeks that I spent in Cairo, in the Spring of 1931, I had many interviews with Dr. Samaan, and he discussed with me what was then known as to the chemistry and pharmacology of Khella. As his results have been recorded in the literature there is no need for me to more than summarize them.

PHARMACOLOGY.

Khella appears to relax all smooth muscle, including that of the ureter. This explains the value claimed for the drug in allowing the passage of stone through the ureter.

The experiments leading to this conclusion were performed with a 10% tincture of the fruits of *Ammi visnaga* and 70% alcohol. The animals used included the pig, bull, cow, camel, sheep and dog. The relaxation of the ureter was greater in the case of the cow and bull, and poorest in the dog and camel. The drug lowers the tonicity of the ureter. Clinically, it relieves spasm of the ureter. The low toxicity of the drug suggests its usefulness in ureteral calculi and spasm of the ureter. Khella was found to possess a fairly strong diuretic action.

PHARMACOGNOSY.

I had the pleasure of meeting Dr. Ibrahim Ragab Fahmy, professor of Pharmacognosy in the University of Cairo. We made excursions into the Valley of the Nile, and he showed me Khella in its wild state, as well as another plant which was liable to be used in mistake for Khella, *viz.*, *Ammi majus*.

Dr. Ragab Fahmy has contributed to the "Report of the Pharmaceutical Society of Egypt," Vol. III, 1931, illustrated descriptions not only of Khella, but

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

also of *Ammi majus*. He states that Khella has been used as a medicine by the general public in Egypt under the name of *Bisr-El-Khelle*, and has established a reputation as a diuretic, in renal colic, and in promoting the passage of small kidney stones through the ureter. In the neighborhood of Kalioub, a few miles from Cairo, he showed me large patches of Khella, as well as of *Ammi majus*. The latter species is known as *Khelle Sheytaniya*. Its fruits so closely resemble those of *Ammi visnaga* that substitution or admixture of the two fruits could be distinguished only with difficulty.

In the Report referred to, Dr. Fahmy thoroughly discusses the anatomical differences between *A. visnaga* and *A. majus*.

CHEMISTRY.

The earliest reference to the chemistry of Khella is that of Ibrahim Mostapha who isolated a crystalline substance with glucosidal properties. Later Malosse

Fig. 1.—Field of *Ammi visnaga*, Foxglove Farm, August 1931.

continued these researches and named the crystalline principles: *Alpha-*, *beta-* and *gamma- Visnagin*.

More recently Dr. Samaan has published two papers on the chemistry of Khella. He finds that the genuine fruit contains six crystalline principles: Visammin 0.31 per cent, visammidin 0.02 per cent, visnaginin 0.02 per cent, visnagidin 0.06 per cent, khellinin 0.38 per cent, khellidin 0.03 per cent, also a liquid oily principle, visnagan 2.15 per cent, and fixed oil 19.4 per cent were isolated. Of these he selects visammin as the important one. It is isolated by concentrating and cooling an ethereal solution of the fruits, yielding a white residue, which by fractional crystallization from water yields separately visammin, visammidin, visnaginin and visnagidin.

Visammin, $C_{14}H_{12}O_5$, m. p. 153° C. has the m. l. d. 105 mg. per Kg. of toad, intralymphatically in three hours. In a concentration of 1:20,000 visammin

increases the height of contraction of the voluntary muscle of the toad. It relaxes all the smooth muscle investigated by direct action on the muscle fibres—toad's blood vessels, mesenteric vein of sheep, rabbit's intestine, guinea-pig and rabbit's uteri, bronchial muscle of the pig and of the dog, and the ureters of the pig, bull, cow and man. The drug lowers the tonicity of the ureter and, if not too concentrated, does not arrest the peristaltic contractions, while the period of relaxation is prolonged.

The drug possesses a mild diuretic effect.

Fig. 2.—A Foxglove Farm Close-up, typical of *Ammi visnaga*.

Visammin is non-irritant and does not hemolyze the red blood corpuscles of the rabbit.

CLINICAL NOTES.

I was fortunate in meeting the dean of the Medical School of the University of Egypt, Dr. Aly Pasha Ibrahim, who has used Khella for over twenty-five years in his practice, first at Assiout and later in Cairo. He said that he could safely say that he had used Khella in thousands of cases, and had confidence in its value

in the removal of stone. Khella has long been used in Egypt as a native home remedy, but now it is used by most Egyptain doctors in stone, pain in the kidney, as a diuretic, and in spasm of the ureter. There is a limit, of course, to the size of stone that it can get rid of.

The adult doses recommended are 1 to 3 fl. dr. of tincture *Ammi visnaga* (1:10) diluted with water, or $^1/_2$ to 2 fl. ozs. of decoction *Ammi visnaga* (1:40 in water), to be taken three times a day before meals. In these doses the drug also acts as a diuretic.

I have potted a plant of Khella, grown in Minnesota from the Egyptian seed, in order to show its characteristics. I am afraid, however, that it will have wilted before it could have been shown in this meeting. I grew an acre of Khella in the summer of 1931, at Foxglove Farm, Lake Minnetonka. It did very well up to the flowering stage late in July and early in August. At this time the roots were suddenly attacked by white grub worms and the plants died before the development of the fruits. The accompanying film and photographs illustrate very nicely the habit of the plant and its striking flat umbels, of which each plant bears so many.

It is my purpose to investigate further the properties and uses of Khella in the hope that it may add a useful drug to our Materia Medica.

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"Public sentiment is everything. With public sentiment nothing can fail; without it nothing can succeed."

A STUDY OF THE ASSAY OF PODOPHYLLUM.*

BY C. N. SPRANKLE AND C. B. JORDAN.

Podophyllum peltatum, commonly known as May Apple or Mandrake root has been used in medicine for ages, in fact, the Indians used it as an anthelmetic and emetic long before the discovery of this country (1). The crude drug and an extract of it were both included in the first U. S. P. of 1820. It was used as a cathartic. The resin, which was first discovered by Dr. John King in 1835 and reported in 1844 (2), was not included until the Fourth Revision of the U. S. P. It was called podophyllin.

The resin was first prepared by making a strong tincture of the drug, evaporating the tincture to the consistency of a thin syrup and adding it slowly, with constant stirring, to cold water, which precipitates the resin. The Fifth Revision required a saturated solution of alum as the precipitant, but this was not satisfactory as the resin was contaminated with the alum. The Sixth Revision required water acidulated with HCl and this precipitant has been used ever since.

R. Bentley in 1861 (3) found that this resin was made up of two resins; one soluble in alcohol and ether, the other soluble only in alcohol. The ether-soluble resin was the active portion; the ether-insoluble portion was inactive and called podophyllic acid. Buchheim in 1873 (4) reported that caustic alkalies converted the ether-soluble portion into an acid modification which was identical with the acid mentioned above. Therefore, he concluded that the active resin must be the anhydride of this acid.

F. B. Power in 1877 (5) verified the presence of two resins in podophyllin and he also found that podophyllin was not a true resin, since it was almost completely soluble upon prolonged treatment with hot water.

Podwissotzki in 1881 (6) published his outstanding investigations of the constituents of podophyllin. He isolated podophyllic acid by making a chloroform extract of the resin and precipitating the podophyllic acid in ether. He then added the ether-chloroform solution to petroleum ether and obtained a heavy, white noncrystalline precipitate of strong physiological action which he called podophyllotoxin. He treated the podophyllotoxin in alcohol with freshly slaked lime, evaporated to dryness and extracted with boiling alcohol, which, upon cooling, deposited long, snow-white, silky crystals which he stated to be active, but unsuitable for use because of its insolubility. He called it picropodophyllin (picro = bitter). He next treated podophyllotoxin with ammonia water and obtained an acid substance which he called picropodophyllic acid. He believed that podophyllotoxin was the product of reaction of picropodophyllin and picropodophyllic acid.

He also isolated a yellow coloring principle from the residue left after the chloroform extraction of podophyllin. This principle so resembled quercetin that he called it podophylloquercetin.

Kürsten in 1891 (7) stated that picropodophyllin is an isomer of podophyllotoxin and not a constituent of it as Podwissotzki had stated. He also stated that some picropodophyllic acid is formed by action of alkalies on podophyllotoxin, but not by hydrolysis.

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

Dunstan and Henry in 1898 (8) verified Podwissotzki's and Kürsten's work and, in addition, clarified the relationship of picropodophyllin and picropodophyllic acid to podophyllotoxin. They stated that podophyllotoxin heated with alkalies gave, by hydration, a salt of an unstable gelatinous acid which they termed podophyllic acid and which they also claimed to be the same as the picropodophyllic acid isolated by Podwissotzki and Kürsten. This acid readily loses a molecule of water to form the crystalline picropodophyllin which is isomeric with podophyllotoxin. It is also quite possible that all of the podophyllic acid does not lose a molecule of water and, hence, we have an explanation of Podwissotzki's supposition that podophyllotoxin yielded both picropodophyllic acid and picropodophyllin on hydrolysis. In addition to the above constituents, Dunstan and Henry isolated an amorphous resinous substance of strong purgative property from the residue left after removal of podophyllotoxin and podophylloquercetin. They called this substance podophylloresin.

It is quite evident that the official resin of podophyllum is not a single substance, but a mixture of complex substances. Podophyllotoxin and podophylloresin are both conceded to be physiologically active, but it has not been definitely proved that they alone are more effective than the combination of all the constituents.

EXPERIMENTAL.

(Podophyllum, podophyllin and podophyllotoxin were purchased from the Eimer & Amend Company.)

The podophyllotoxin purchased was noted to be of a dirty greyish yellow color rather than white as had been reported. Hence, its solubility in alcohol, chloroform, ether and water was tested and it was found to be only partially soluble in all except alcohol. This indicated an impure or chemically altered product, if reports in literature were correct. Podophyllotoxin was then prepared by extracting podophyllin with chloroform, evaporating to the consistency of a thin syrup, precipitating the podophyllic acid in ether and finally adding the ether-chloroform solution slowly to twenty times its volume of petroleum ether. A heavy, flocculent, white precipitate, resulted. This product was filtered, redissolved in chloroform, reprecipitated in petroleum ether, filtered, washed with petroleum ether and dried at room temperature. This final product was a fine, white crystalline substance which was soluble in alcohol, chloroform and ether, but only a part of it formed a colloidal solution in hot water.

Kremel in 1889 (9) and Eder and Schneiter in 1926 (10) proposed assays for content of podophyllotoxin in podophyllum and podophyllin by extracting with chloroform and precipitating in petroleum ether, but this is not satisfactory since it does not remove the podophyllic acid which is inert physiologically. Gordin and Merrill in 1903 (11) proposed an assay for content of podophyllotoxin in podophyllin by treating the podophyllin with freshly slaked lime in the presence of alcohol to convert the podophyllotoxin to picropodophyllin, filtering, evaporating an aliquot part to dryness and weighing it as picropodophyllin.

This quantitative conversion of podophyllotoxin into its isomer, picropodophyllin, was attempted but without success.

Since podophyllotoxin is not the only active constituent, it was decided to return to the resin itself.

There was no color test found in literature for podophyllin. In an attempt to find a color test to be used in determining complete extraction of the resin from the drug, all of the common alkaloidal, protein and qualitative reagents were added to either an ammonia water or glacial acetic acid solution of the resin, but none proved satisfactory.

However, there was one which gave indications of being of value. To an ammoniacal solution of the resin, a 5% solution of $CuSO_4$ was slowly added. A dark green color resulted instead of the expected characteristic deep blue color of the copper-ammonia complex ion. This green color darkened somewhat and persisted until a large excess of copper sulphate had been added which then gave the characteristic deep blue color. But it was found that an ammonia water extract of the marc left after complete extraction of the resin gave the same color as also did other resins, for example: Jalap, scammony, etc.

Podophyllin was prepared by the U. S. P. method, substituting different solvents for alcohol with the following results:

TABLE I.

Solvent.	Total Extractive.	Per Cent Resin.
Alcohol	....	3.65
Acetone	....	3.54
Alcohol and acetone (1 + 1)	....	3.63
Alcohol and ether (1 + 1)	....	3.02
Alcohol (after maceration with excess of water)	11.374	3.59
Acetone (after maceration with excess of water)	11.395	3.60

Acetone is a much more rapid solvent than alcohol, but a larger amount is required for complete extraction. Too much water was used in the last two extractions and the drug swelled to almost twice its normal volume. Percolation was very, very slow and, upon evaporation, a very disagreeable mass resulted from which it was difficult to remove the resin.

Alcohol seems to be the best and most practical solvent.

QUANTITATIVE ANALYSIS OF THE DRUG.

Because of the complexity of this resin, it was decided to assay the drug for total content of resin using alcohol as the solvent. The assay methods applied to the drug were: U. S. P. IX, U. S. P. X, Jenkins' (12) and Warren's modification of Jenkins' method (13).

The following is a brief outline of the four methods listed:

The U. S. P. IX Method.—Make a strong tincture by cold maceration and percolation of a ten-Gm. sample, evaporate to the consistency of a thin syrup and add slowly with constant stirring to 10 cc. of 0.6% HCl water. Filter and dry the resin to constant weight at 80° C.

The Jenkins' Method.—Digest a 10-Gm. sample on a water-bath for three hours with 25 cc. of alcohol, transfer to a percolator, percolate slowly till 45 cc. are collected. Cool and make up to 50 cc. Mix thoroughly. Transfer a 10-cc. aliquot part to a separator, add 10 cc. of 0.6% HCl and 10 cc. of chloroform and shake. Draw off the alcohol-chloroform layer into another separator, wash the acid layer twice with 15-cc. portions of alcohol-chloroform mixture (1 + 2). Mix the washings with the extraction in the second separator, add 10 cc. of 0.6% HCl, shake and draw off the lower layer into a tared vessel. Wash the acid layer twice as before with the

alcohol-chloroform mixture, adding the washings to the tared vessel. Evaporate to dryness and dry to constant weight at 100° C.

The U. S. P. X Method.—Digest a 10-Gm. sample with 60 cc. of alcohol for three hours as above and collect 95 cc. of percolate. Cool, make up to 100 cc. and transfer 20-cc. aliquot part to a separator. Add 20 cc. of a saturated solution of potassium citrate (20 Gm. of potassium citrate in 12 cc. of water) and 10 cc. of chloroform. Shake well and allow to separate over night. Draw off potassium citrate layer and discard. Then draw off alcohol-chloroform layer, filter it into a tared vessel and rinse out the separator with alcohol-chloroform mixture (2 + 1). Evaporate to dryness and dry to constant weight at 100° C.

L. E. Warren's Modified Jenkins' Method.—Prepare the tincture as by the U. S. P. X method except for one-half hour digestion. Take 10-cc. aliquot part in a separator and proceed as in the Jenkins' method, using 0.6% HCl as the precipitant, but wash the acid layer three times instead of twice with the alcohol-chloroform mixture. Evaporate the final extractions just to dryness, add 1 cc. of dehydrated alcohol, again evaporate to dryness and dry to constant weight at 80° C.

The results were:

TABLE II.

U. S. P. IX.	U. S. P. X.	Jerkins'.	Warren's Modification.
3.86%	6.58%	6.91%	6.60%
3.88%	6.82%	7.07%	6.68%
3.72%	27.90%	5.90%	6.71%
3.60%	14.79%	5.43%	6.53%
	9.94%	8.08%	
	17.16%	7.38%	
		6.82%	
		6.98%	

The U. S. P. IX method is a cold percolation method, whereas the others are hot digestion and percolation methods. It will be noted that the hot processes yield a much higher per cent of resin than the cold percolation method. The marc from two of the U. S. P. IX samples were subjected to the Jenkins' method and gave additional resin as follows: 0.85%, 1.15%. This additional resin conformed to the U. S. P. requirements for the resin. The U. S. P. IX process is long and more cumbersome than the others. The U. S. P. X method gave poor results because of contamination of the resin with potassium citrate. A bad feature of this assay is the formation of a thick, brown scum at the junction of the saturated potassium citrate solution and the alcohol-chloroform solution in the separatory funnel upon standing over night. In the first series this scum was drawn off and discarded with the saturated potassium citrate solution and the results checked closely, but the resin was contaminated with potassium citrate. In later series this scum was left with the alcohol-chloroform solution and filtered with it, but the results were very high. When the saturated solution of potassium citrate is drawn off, much of it clings to the stem of the funnel and is washed off on to a filter paper when the alcohol-chloroform solution is drawn off. This is undoubtedly a source of much of the contamination.

The scum from another series was drawn off and examined. It was found to be a super-saturated solution of potassium citrate with a little incorporated resin.

In addition to the above sources of error, some of the resin remains in the filter paper when the alcohol-chloroform solution is filtered. It is not washed through even by an excess of the alcohol-chloroform solvent.

The results by Jenkins' method did not check very closely. Quite likely this

is due to incomplete washing out of the resin in percolation, as only fifty cubic centimeters of percolate are collected.

The results by Warren's modification were very good. The only questionable point was the half-hour digestion. To determine whether length of time of digestion effects the results, four samples were run by the Warren method, except that they were digested three hours. The results were:

TABLE III.

Half-Hour Digestion.	Three-Hour Digestion.
6.71%	6.82%
6.53%	6.69%
6.60%	6.76%
6.68%	6.84%

An increase of one-tenth of one per cent resulted from this longer digestion.

The Jenkins' method was again applied to ten-gram samples, taking the precaution to percolate slowly by adding the alcohol in small portions to insure complete washing out of the resin. Jenkins' method directs washing the acidulated water in the separator twice with the alcohol-chloroform mixture. The above samples were washed three times and resulted in an increase as the following results will show.

TABLE IV.

Washing Two Times.	Washing Three Times.
6.74%	
6.45%	6.81%
6.63%	6.55%
6.58%	

Dr. W. L. Scoville of Parke, Davis and Company, suggested that the saturated solution of potassium citrate be made just acidic with acetic acid to prevent the scum formation. He also suggested that the alcohol-chloroform mixture be drawn off at the top of the separator after the saturated potassium citrate solution had been drawn off at the bottom. His first suggestion prevented the scum formation, but the latter suggestion did not prevent the contamination of the resin, for, after shaking the two solutions together in the separator, and allowing them to stand over night, some of the potassium citrate crystallizes out around the top and is washed on to the filter paper when the alcohol-chloroform solution is drawn off. The results obtained by following Dr. Scoville's suggestion were:

TABLE V.

	I.	II.	III.
Sample 1	12.71%	18.48%	9.01%
Sample 2	7.23%	12.16%	12.08%

The disadvantage of the U. S. P. X method is the contamination of the resin with potassium citrate. A possible error in the Jenkins' and Warren's methods is that some of the resin may be soluble in the weakly acid solution used for precipitation. To investigate this possible error, two samples of purchased podophyllin were dissolved in ten cubic centimeters of alcohol, transferred to a separator and subjected to the Warren method. A slight loss occurred as follows:

TABLE VI.

	I.	II.
Weight of sample	0.0734	0.1359
Weight recovered	0.0707	0.1331
Loss in weight	0.0027	0.0028

This is not truly indicative of positive loss, however, since this was a purchased sample and may have contained water-soluble material.

The Warren modification directs drying at 80° C. and the U. S. P. X and Jenkins' methods at 100° C. The higher temperature results in a much darker colored resin. When the solubility of these two products in alcohol were examined, it was found that the resin dried at 80° C. is completely soluble, whereas the resin dried at 100° C. is not completely soluble. No doubt chemical alteration takes place when the resin is dried at the higher temperature.

SUMMARY.

The U. S. P. IX method is long and does not extract all of the resin. The U. S. P. X method is not practical because of the potassium citrate which contaminates the final product. The Jenkins' method, if care is taken to percolate slowly by adding just a little alcohol at a time and if the acidulated water is washed three times with the alcohol-chloroform mixture, will give good results. The Warren modification of the Jenkins' method, with our suggested additional modification of digesting three hours instead of one-half hour, will give the best results and seems to be the most practical for inexperienced as well as experienced analysts.

If the cold process for the manufacture of the resin remains official in the U. S. P. XI, then the U. S. P. IX assay method would be the logical one for content of available resin. However, the assay should be for total content of resin. Should the revision committee wish to include an assay method which assays approximately twice the amount of resin that can be obtained by the official process of manufacture, then the following method is recommended to insure accurate results by the average analyst.

(The Jenkins' method, modified by L. E. Warren and further modified as suggested by us):

Place 10 Gm. of drug (No. 60 powder) in a 125-cc. Erlenmeyer flask and add 60 cc. of alcohol. Fit a stopper with a glass tube for refluxing (a reflux condenser may be substituted) and heat on a water-bath for three hours. Transfer to a small percolator and percolate slowly with warm alcohol till 95 cc. have been collected. Cool, make up to exactly 100 cc. and mix thoroughly.

Transfer 10 cc. of the above tincture to a separator, add 10 cc. of chloroform and 10 cc. of 0.6% hydrochloric acid. Shake, allow to separate and wash the acid layer three times with successive 15-cc. portions of alcohol-chloroform mixture (one volume alcohol and two volumes chloroform), adding the washings to the second separator. Add 10 cc. of 0.6% hydrochloric acid to the combined extract and washings, shake, allow to separate and draw off the alcohol-chloroform layer into a tared vessel. Wash the acid layer three times with 15-cc. portions of the alcohol-chloroform mixture, adding the washings to the tared vessel. Evaporate the combined extractions on a water-bath to apparent dryness, add 1 cc. of dehydrated

alcohol and again evaporate to dryness. Dry to constant weight at 80° C. Weight of residue multiplied by 100 gives the per cent of resin in the drug.

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PERMANENT COLOR STANDARDS FOR U. S. P. COD LIVER OIL, ALMOND OIL AND CASTOR OIL.*

BY ABRAHAM TAUB.

The need for the more definite specification of color for certain U. S. P. oils has been frequently pointed out both by manufacturers and food and drug enforcement officials. To describe an oil as pale yellow in the U. S. P. monograph may lead to several ambiguous interpretations. It may imply that a colorless oil would not meet the U. S. P. requirements; or it may leave the observer in doubt as to whether the oil in question is slightly darker than pale yellow. Furthermore, the term pale yellow does not distinguish between greenish yellow and reddish yellow. Only a quantitative standard can obviate this condition.

While there are many instruments on the market for the specification of color, it is felt that a simple and inexpensive method would be more desirable for most laboratories. It is the purpose of this paper to set up permanent color standards for these oils by using the Arny "Co–Fe–Cu" inorganic colored fluids. The colors exhibited by the U. S. P. oils which were studied, required the use of only two of these inorganic fluids to produce proper matches—the $M/4$ $CoCl_2 \cdot 6H_2O$ and the $M/6$ $FeCl_3 \cdot 6H_2O$, both acidulated with 1% HCl to prevent hydrolysis and insure permanent stability.

For checking the closeness of the match, a Bausch & Lomb spectrophotometer was used. A number of the "Co–Fe" blends were made up which closely approximated the color of the oil being studied, and the particular blend whose spectrophotometric curve most nearly coincided with the spectrophotometric curve of the oil was adopted. The reason for using this instrument rather than a colorimeter or tintometer was to produce a match which would not appear different under different light conditions. It has been definitely shown that two liquids whose spectral transmission curves are alike will appear the same under different conditions of light; this is not necessarily true for two liquids which give the

* Scientific Section, A. PH. A., Toronto meeting, 1932.

same colorimeter readings. In this particular study it was not possible to get exact coincidences of transmission curves due to inherent differences in the light transmissions of oils and these salt solutions. They were sufficiently close, however, to be of practical use for preparing these color standards.

All the liquids were examined spectrophotometrically in 100-mm. tubes. For actual matching by the eye, the oils and the "Co–Fe" solutions were examined in 4-ounce, tall, cylindrical, oil-sample bottles. These measure 35 mm. outside diameter and 135 mm. from shoulder to base.

I. COD LIVER OIL.

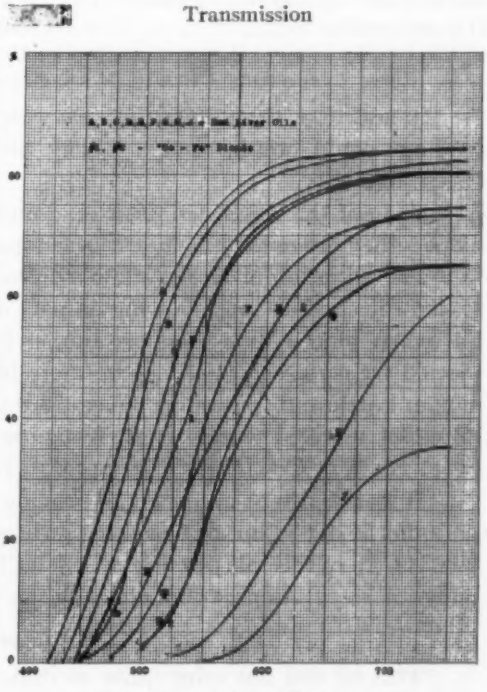
The Pharmacopœia provides that cod liver oil shall be a pale yellowish oil obtained from fresh livers. Since excess acidity due to age can be easily removed, the only other indications of freshness are color, odor and taste. As it is almost impossible to set up any quantitative standards for odor and taste, color is left as the chief criterion of freshness. It should, however, be noted that other factors enter into the color of an oil: the fatness of the livers, the mode of rendering and the food of the fish. Oils from the Bay of Fundy may be reddish; Newfoundland, New England and Scottish oils may be dark yellow to amber; while Lofoten (Norwegian) oils are probably the lightest in color. Although the colors of these oils may not detract from their therapeutic efficacy, some of the darker oils in fact having a higher vitamin potency, the public has become accustomed to the light-colored oils for medicinal purposes; the darker oils are used primarily for stock and poultry feeding. The food and drug enforcement official is therefore confronted with the problem of setting up a dividing line between these two classes of oils. It is the purpose of this study to attempt to set up such a division on the basis of oils at present on the market.

Curve A represents two almost colorless oils of the 1932 season.

Curve B represents two very pale yellow Norwegian oils from two to six months old.

Curve C represents a large proportion of the oils examined, nineteen in number. They are pale yellow in color and have the following origin: ten are Newfoundland oils of the 1931 season; one is Norwegian, one year old; seven are miscellaneous importations of this year; and one is a two-year old specimen.

Curve D also represents a good proportion of the samples. There are eleven oils in this group. Though a little darker than the "C" group, they might still be classified as light yellow. Their origin is as follows: five are Norwegian, three of this season and two of 1930; three are Newfoundland; one is a New England-Newfoundland blend; one is an importation of this year and one is a four-year old specimen of unknown source.



Wave-length in millimicrons

Fig. 1.—Cod liver oil.

Fifty-four samples of oil were examined, representing manufacturers' samples, importations received at the Bureau of Chemistry and samples obtained in the open market. It was found that when these oils were grouped on the basis of color they represented nine different hues. In Fig. 1 is shown the spectral transmission curves of these nine groups, from the lightest, "A," to the darkest, "J."

Since the oils included in the first four curves represent 64% of all the oils examined, and since their colors might reasonably be included under the term pale yellow or light yellow, it is believed that if any standard is to be set, it should not be lighter than that expressed by Curve D. Accordingly a "Co–Fe" blend was prepared to match the color of the group D oils.

Curve No. 1 represents the transmission of this "Co–Fe" blend, which was prepared by mixing 3.6 cc. of $M/4$ $CoCl_2 \cdot 6H_2O$, 48.4 cc. of $M/6$ $FeCl_3 \cdot 6H_2O$ and 68 cc. of distilled water. It will be noted that Curve No. 1 approximates Curve D fairly closely.

Curve E represents four oils which may be called distinctly yellow. One is a three-year old Norwegian oil, two are this year's importations, and one is a product which is being marketed as a poultry oil.

Curve F represents five yellow oils somewhat darker than the "E" group. Three are importations which were considered too dark by officials to be classified as of medicinal grade; one is a 1929 New England oil; and one is a 1927 blended oil.

Curve G is representative of one oil of light amber color. It is a blend of New England and Newfoundland catches, 1931 season. This oil meets all U. S. P. requirements except that of color. If it is desired to set a standard which will not exclude the more highly colored American oils, this would be the place to set such a standard. It must be realized of course that such a standard would permit oils now being marketed as stock feeds, as well as five-year old oils, to be accepted as within the requirements of the U. S. P. for medicinal cod liver oil. Curve No. 2 represents the "Co–Fe" blend which matches the color of the "G" oil. It is prepared by mixing 76 cc. of $M/6$ $FeCl_3 \cdot 6H_2O$, 11 cc. of $M/4$ $CoCl_2 \cdot 6H_2O$ and 33 cc. of distilled water. Curve H represents three amber-colored, imported oils having a rancid odor.

Curve J represents a reddish Norwegian oil about ten years old. Its odor is rancid.

In addition, three imported oils were so dark that their spectral transmission readings could not be taken. They are reddish black and have a nauseating, cheese-like odor.

None of the last seven oils would meet U. S. P. standards on the basis of odor alone; they are merely included for comparison.

The adoption of either standard No. 1 or standard No. 2 would require some statement such as the following as part of the monograph for cod liver oil: The oil, when placed in a 4-ounce, tall, cylindrical, standard oil-sample bottle, and viewed transversely, shall not be more highly colored than a solution placed in a similar bottle and containing 3.6 cc. $M/4$ $CoCl_2 \cdot 6H_2O$, 48.4 cc. $M/6$ $FeCl_3 \cdot 6H_2O$ and 68 cc. of distilled water. (Or if standard No. 2 is adopted, these figures would be 11 cc. $M/4$ $CoCl_2 \cdot 6H_2O$, 76 cc. $M/6$ $FeCl_3 \cdot 6H_2O$ and 33 cc. of distilled water.)

It would also be necessary to provide for two test solutions: $M/4$ $CoCl_2 \cdot 6H_2O$ contains 59.4965 Gm. of this salt per liter of 1% HCl. $M/6$ $FeCl_3 \cdot 6H_2O$ contains 45.054 Gm. of this salt per liter of 1% HCl. Provision should be made for standardizing these solutions volumetrically, as described in a previous paper.[1]

II. ALMOND OIL.

This oil did not offer quite so difficult a problem as the cod liver oil, as its range of color does not extend beyond a greenish yellow. Eleven oils were examined

[1] Arny and Taub, JOUR. A. PH. A., 12 (1923), 839.

representing manufacturers' samples and purchases on the open market. Although the U. S. P. describes almond oil as a clear, pale, straw-colored or colorless oil, less than half of the oils examined could be placed in this category.

Figure 2 shows the transmission curves of the five distinct hues into which these oils could be classified.

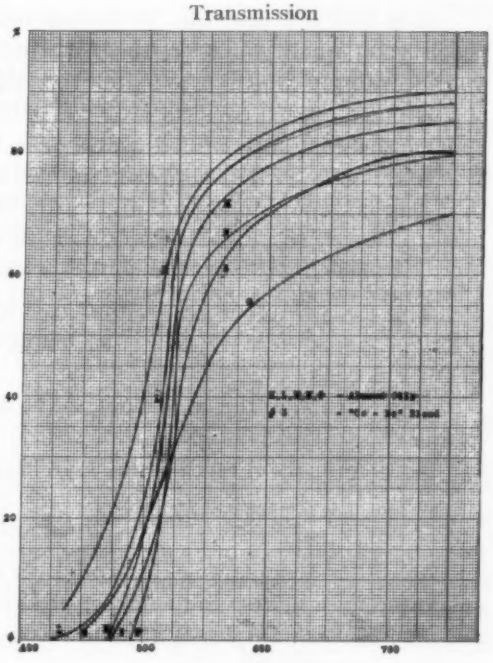
Curve K represents the lightest colored oil. It is an American oil which is almost colorless.

Curve L shows the transmission of an English oil which is a very pale yellow.

Curve M is representative of six French and Italian oils of a lemon-yellow shade; one of the oils was three years old, but the others were fresh specimens.

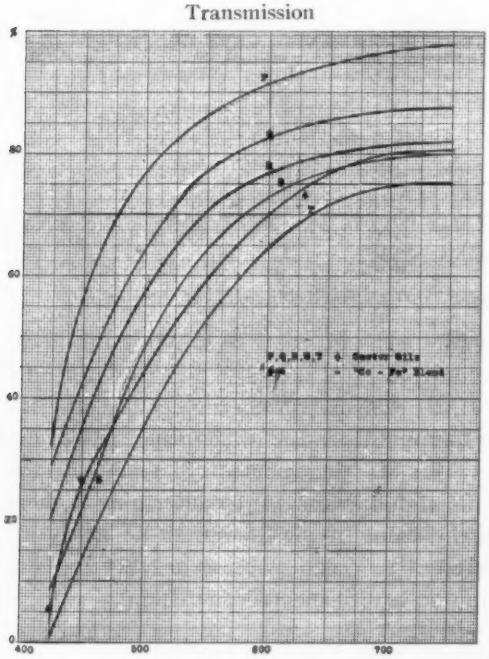
Curve N represents two oils of somewhat more intense hue than the "M" group. One was fresh, and one a year old.

Curve O is quite different in appearance than any of the others. The oil was a fairly old specimen which had developed a haziness and therefore would not conform to the U. S. P. on the question of clarity.



Wave-length in millimicrons

Fig. 2.—Almond oil.



Wave-length in millimicrons

Fig. 3.—Castor oil.

Curve P represents an oil which appears almost colorless.

Curve Q represents three oils which are a very faint yellow.

Curve R shows two oils which are pale yellow.

Curve S represents a pale yellow oil which has a very light brownish tint. This is the darkest color obtained for any of the fresh oils examined. It is obvious, of course, that these descriptions of color are purely qualitative and subjective. To a casual observer all of the above groups might appear nearly colorless.

Curve T represents two oils which are light yellow. Both are about five years old and have a rancid odor.

Curve No. 4 represents the transmission of the "Co–Fe" blend which has been set up as the standard. It matches group "S." The blend consists of 2.5 cc. of $M/4$ $CoCl_2 \cdot 6H_2O$, 8.5 cc. of $M/6$ $FeCl_3 \cdot 6H_2O$ and 111 cc. of 1% hydrochloric acid. The latter is used in place of distilled water since the amount of HCl present in the small volumes of the "Co" and "Fe" solutions would not be enough to prevent hydrolysis in so large a dilution.

It is believed that the "N" group represents the maximum intensity of color which good quality oils on the American market possess. A "Co–Fe" blend was accordingly prepared to match this color. Curve No. 3 shows the transmission of this blend, which consists of 68 cc. of $M/6$ $FeCl_3 \cdot 6H_2O$, 3.5 cc. of $M/4$ $CoCl_2 \cdot 6H_2O$ and 48.5 cc. of distilled water.

If this standard is adopted, the directions for matching should be similar to that specified under cod liver oil.

III. CASTOR OIL.

The U. S. P. X specifies that castor oil shall be a pale yellowish or almost colorless transparent liquid. The majority of the nine oils studied were practically colorless.

Figure 3 shows the curves of the five distinct hues into which these oils could be grouped.

As before, the directions for matching should be stated as under cod liver oil.

SUMMARY.

1. Fifty-four samples of cod liver oil were examined and color standards suggested for a lighter and a darker product.

2. Eleven samples of almond oil were examined and a standard proposed for maximum permissible color.

3. Nine samples of castor oil were examined and a standard proposed for maximum permissible color.

4. Directions have been given for preparing the permanent color standards, making use of the Arny "Co–Fe–Cu" color system.

DEPARTMENT OF CHEMISTRY,
COLLEGE OF PHARMACY,
COLUMBIA UNIVERSITY.
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THE BACTERICIDAL EFFICIENCY AND TOXICITY OF CREOSOTE AND ITS COMPONENTS.*

BY LOUIS GERSHENFELD, RALPH PRESSMAN[1] AND HORATIO C. WOOD, JR.

The purpose for which this study was undertaken may be stated as follows: (1) to determine the variation in bactericidal power of creosote, (2) to determine whether the standards mentioned in the U. S. Pharmacopœia for specific gravity and boiling point are an indication of the therapeutic value of the drug, (3) to determine whether creosote depends largely for its therapeutic efficiency on the guaiacol and creosol as is implied in the official definition, (4) to determine if there are any one or two constituents to which the value of the drug may be justly attributed and (5) to determine whether different samples of creosote vary in their toxicity and if so can the variation be attributed to any special constituent.

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

[1] Maltbie Chemical Co., Research Fellow, Philadelphia College of Pharmacy and Science, 1929–1931.

The medicinal uses of creosote are, as far as we know, attributable to two properties, namely, its bactericidal power and its expectorant action. Various authors have attributed the value of the drug in tuberculosis to its anti-bacterial properties, but most recent authorities believe that it is highly improbable that the quantities employed therapeutically can exert any antiseptic action in the lungs and are inclined to assign such benefit as may result from its use to some expectorant effect. As we know of no method for the quantitative estimation of expectorant action we have used entirely the bactericidal potency as the criterion of efficiency.

Creosote, being the product of a rather crude chemical process (the destructive distillation of wood), it is to be expected that its composition will vary considerably according to the sort of wood from which it is obtained and the conditions of its manufacture. Sickman and Fischelis (1) in the examination of 16 commercial samples found considerable variations in the physical properties and in the proportion of methoxyl phenols (the methoxyl content represents the combined guaiacol and creosol).

Bactericidal Powers.—Ewe (2) reported that creosote has a phenol coefficient (by Hygienic Laboratory) of 3.62. Sternberg (3) found 1:200 killed micrococci of pus in 2 hours. Guttman (quoted by Sternberg) states that 1:300 killed *B. pyocyan.* and *B. anthracis* in 1 minute. Marfori (4) mentions that guaiacol, 1%, kills *B. tubercul.* in 2 hours and many other bacteria in 20 to 30 minutes. DeWitt, Benyenga and Wells (5) found that 0.5% of creosote destroyed all tubercle bacilli in one hour and 0.1% in 24 hours. Guttman reached the conclusion that creosote is definitely superior to phenol in antiseptic action.

While the literature leads to the conviction that creosote has a stronger bactericidal action than carbolic acid, there is singularly little definite information on the exact disinfectant properties of creosote, and still less of its variability.

Experimental.—Our own tests were made by the Hygienic Laboratory Method[1] employing as test organisms *B. typhosus* and *Staphylococcus aureus.* Twenty-four-hour growths which have been transplanted for at least three consecutive days were used. The procedure was as follows: Into 5 cc. of an aqueous solution of the sample of designated dilution introduce 0.1 cc. of a filtered bouillon culture of organisms (24 hours old); shake and allow to remain in contact with the sample. The test is carried out in a standard water-bath at 20 degrees C. At intervals of $2^1/_2$, 5, $7^1/_2$, 10, $12^1/_2$ and 15 minutes a standard loopful (4 mm. diameter) of this mixture is transplanted into a test-tube containing 10 cc. of sterile bouillon. The transplants are incubated at body temperature for forty-eight hours. Table I gives the details of tests of one sample.

TABLE I.—SHOWING DETAILS OF TEST OF PHENOL COEFFICIENT OF A SAMPLE OF CREOSOTE.

Time of Exposure.		$2^1/_2$.	5.	$7^1/_2$.	10.	$12^1/_2$.	15.
	1:100	−	−	−	−	−	−
Phenol	1:110	+	−	−	−	−	−
Dilution	1:120	+	+	−	−	−	−
	1:130	+	+	+	−	−	−
	1:140	+	+	+	+	+	+

[1] This research was begun before the publication of the recent change in technique (using 0.5 cc. of test organism culture) and it was deemed advisable to continue by the original technique so that results would be more accurately comparable.

TABLE I.—SHOWING DETAILS OF TEST OF PHENOL COEFFICIENT OF A SAMPLE OF CREOSOTE. (*Continued.*)

Creosote	1:390	−	−	−	−	−	−
Sample No. 16	1:400	+	−	−	−	−	−
	1:410	+	−	−	−	−	−
	1:420	+	+	+	−	−	−
	1:430	+	+	+	+	+	+

Weakest dilution of phenol killing in $2^1/_2$ minutes: 1:100
Weakest dilution of creosote killing in $2^1/_2$ minutes: 1:390
Weakest dilution of phenol killing in 15 minutes: 1:130
Weakest dilution of creosote killing in 15 minutes: 1:420

$$\frac{\frac{390}{100} + \frac{420}{130}}{2} = 3.56.$$ Phenol coefficient, 3.56.

Studies were made on seventeen samples of creosote. All samples except No. 14 (which was a semi-refined creosote) and No. 16 (which was marked B. P. 1882) were offered as U. S. P. In most instances simultaneous tests were made with phenol, so that the results could be given as "phenol coefficients."

The phenol coefficients for the 17 samples ranged between 2.2 and 3.9 for both organisms, with an average of 3.0. The variation in strength is not the same for the two species of bacteria; that is, a sample of creosote might be relatively potent against the typhoid bacillus but less efficient against the *Staphylococcus aureus* or vice versa. There is, however, in the majority of cases a considerable degree of similarity in the two sets of tests. The strongest sample showed a coefficient of 3.9 for the typhoid bacillus and 3.8 for the *Staphylococcus aureus;* the weakest gave 2.45 for both species of bacteria. The widest discrepancy was found in a sample of semi-refined creosote which showed a coefficient of 3.8 for the *Staphylococcus aureus* but only 3.0 for the typhoid bacillus.

TABLE II.—SHOWING THE RELATION BETWEEN BACTERICIDAL POWER AND PHYSICAL CONSTANTS.

Phenol Coefficient.			Per Cent Distilling at	
B. typh.	*Staph. aureus.*	Specific Gravity.	200–210° C.	210–220° C.
3.9	3.8	1.073	37	45
3.6	3.0	1.075	54	30
3.4	3.0	1.077	55	36
3.15	2.2	1.078	56	37
3.1	3.4	1.081	50	42
3.05	3.0	1.079	55	36
3.0	2.45	1.077	57	34
3.0	2.4	1.075	53	39
3.0	3.8	1.083	32	49
2.95	3.1	1.082	10	74
2.8	3.25	1.076	46	41
2.8	2.5	1.078	36	55
2.75	2.6	1.083	46	44
2.6	3.3	1.080	50	42
2.6	2.45	1.080	23	64
2.45	2.45	1.083	57	37

Sixteen of these samples were those whose physical constants were reported by Sickman and Fischelis.[1] A study of these physical constants in comparison

[1] We desire to express our thanks to Dr. Robert Fischelis for his coöperation.

with disinfectant properties failed to show any constant relationship. Table II, arranged in descending order of efficiency against the typhoid bacillus, shows also the *Staphylococcus aureus* phenol coefficient and the specific gravity and distilling temperatures as reported by Sickman and Fischelis.

Although a comparison of these samples of creosote failed to show any consistent relationship between the proportions distilling at a given temperature and the bactericidal powers, it was thought advisable to study more carefully the comparative effects of the fractional distillates. This we did on 2 samples of creosote which were fractionated for us by Mr. Sickman. One of these was made up of fractions distilling between 200° C. and 220° C. and the other of fractions distilling from 187° C. to 225° C. (the U. S. P. states that creosote "begins to distil at about 200° C."). The phenol coefficients of these samples against both test organisms are given in the following tables.

TABLE III.—CONCENTRATION OF FRACTIONAL DISTILLATES OF CREOSOTE (FIRST SAMPLE) REQUIRED TO KILL BACILLUS TYPHOSUS.

Fraction (° C.).	Kills in 2½ Min.	Kills in 15 Min.	Fraction (° C.).	Kills in 2½ Min.	Kills in 15 Min.
200–201°	1:250	1:300	210–211°	1:200	1:250
201–202°	Not tested		211–212	1:200	1:250
202–203			212–213	1:200	1:250
203–204	1:200	1:250	213–214	1:250	1:300
204–205	1:200	1:250	214–215	1:250	1:300
205–206	1:200	1:250	215–216	1:250	1:300
206–207	1:150	1:200	216–217	1:250	1:350
207–208	1:150	1:200	217–218	1:250	1:350
208–209	1:150	1:200	218–219	1:300	1:350
209–210	1:150	1:200	219–220	1:300	1:350

Second Sample.

Distilling at (° C.).	Phenol Coefficients. *B. typh.*	*Staph. aureus.*	Distilling at (° C.).	Phenol Coefficient. *B. typh.*	*Staph. aureus.*
Below 187	2.25	1.7	208–210	2.75	2.7
187–195	2.4	1.9	210–213	2.75	2.9
195–200	2.5	2.1	213–216	2.75	2.9
200–202	2.5	2.1	216–218	2.75	2.9
202–204	2.25	1.9	218–220	2.75	2.9
204–206	2.4	2.1	220–225*	3.2	3.5
206–208	2.5	2.3	Whole Creosote	3.2	3.0

* The residue, not distilling at 225° C. which represents about 8.5 per cent of the whole creosote, was not tested because of its insolubility.

While there are some minor divergences in the two series, it will be noted that there is in both of them an obvious indication that the most active fractions are those boiling above 210° C. The greater activity of the fractions between 190° C. and 202° C., as compared to those of a few degrees higher, we believe may be attributed to the presence of cresols, which boil at these temperatures.

Unfortunately, we did not have any samples of the original creosote from which the fractions in No. 1 were obtained, the whole quantity having been used in the distillation. In No. 2, however, the whole creosote showed a phenol coefficient for both bacteria of 3.2 which is higher than any of its fractions distilling below 220° C. The residue left after distillation at 225° C. was so insoluble that we could not accurately determine its phenol coefficient.

Is Guaiacol the Chief Constituent?—The Pharmacopœia defines creosote as "a mixture of phenols principally guaiacol and creosol." The investigations of Sickman and Fischelis have shown that from a chemical standpoint this statement is somewhat exaggerated. They found that in 16 samples the methoxyl content ranged from 10.98 to 16.30% with an average of 12.92%. If all the methoxyl compounds are calculated as guaiacol this would correspond to an average guaiacol content of 51.7%. It seems to us inaccurate to speak of a mixture of which approximately one-half is guaiacol as consisting "principally" of guaiacol.

DeWitt, Benyenga and Wells report that guaiacol is about one-half as efficient a bactericide for the tubercle bacillus as creosote. Kuprianow (6) found that guaiacol was not only inferior to creosote but also to carbolic acid in its bactericidal powers. We have not been able to find any bacteriologic studies of creosol.

The Pharmacopœia recognizes two forms of guaiacol, one which is derived from creosote, occurring as a liquid; and the other, which is crystalline, is manufactured synthetically. Obviously, the liquid natural guaiacol is not as pure as is the synthetic. We have tested the bactericidal efficiency of a commercial liquid guaiacol, a synthetic crystalline guaiacol obtained from Eastman Kodak Company and a synthetic creosol, made by Sickman. The following table shows the results.

	Phenol Coefficient.	
	B. typh.	*Staph. aureus.*
Natural guaiacol (liquid)	1.62	1.7
Synthetic guaiacol (crystals)	1.05	1.1
Creosol (synthetic)	1.4	0.7

It will be noted in this table that the natural is about half as active as the average commercial creosote and that the purer, synthetic, guaiacol is only about $^1/_3$ as efficient as creosote. Creosol has about the same disinfectant powers as guaiacol.

It is obvious that the bactericidal action of creosote does not depend principally either on guaiacol or creosol.

The Other Constituents of Creosote.—Having found that guaiacol and creosol were not the most active constituents we have tested a considerable number of the other ingredients in the hope of finding one with outstanding bactericidal properties. A study of the efficiency of the fractional distillates indicates that the most active constituents are those with a boiling point of 215° C. or over. An exception to this was noted in one set of distillates examined in which the fractions below 202° C. were very active. These low boiling fractions are composed chiefly of cresol.

The following table shows the phenolic bodies generally recognized to be components of creosote together with the boiling points given in the International Critical Tables:

	°C.		°C.
Cresols	191–203	Dimethyl-guaiacol (traces)	230
Guaiacol	205	Xylenols (1:3:4 and 1:3:5)	218, 219
Ethyl-phenol (1:2)	207	Pyrogallol derivatives	265–290
Ethyl-guaiacol (1:3:4)	?	Coerulignol (traces)	241
Creosol	222	Catechol	245

Of these compounds the germicidal efficiency of cresol is too well established to need further study; and we have reported above on the activity of guaiacol and

creosol. Of the other components we were unable to obtain either ethyl-phenol[1] or dimethyl-guaiacol. We were kindly furnished by Mr. Sickman samples of the 4-ethyl-guaiacol, 4-*n*-propyl-guaiacol (this is supposed to be the same as the somewhat mysterious "coerulignol"), and butyl-guaiacol. In addition to these we were able to purchase from the Eastman Co. samples of three of the dimethyl-phenols including one of those reported in creosote.

Klarmann, Shternov and von Wowern (7) have reported a phenol coefficiency for xylenol (not stating which one of the isomers they tested) of 5 for *B. typhosus*, and 5.6 for *Staph. aureus;* this agrees closely with our results given in the following table:

Sample.	Phenol Coefficient. *B. typhosus.*	*Staph. aureus.*
1,2,4-Dimethyl-phenol	5	5
1,2,5-Dimethyl-phenol	5	5
1,3,5-Dimethyl-phenol	3	3
4-Ethyl-guaiacol	6.1	5.1
n-Propyl-guaiacol	8.5	1.07
4-*n*-Butyl-guaiacol	15	1.07

While we did not know of any study indicating the proportion of these phenols occurring in creosote it seems to us that our results suggest very strongly that the superiority of creosote over guaiacol and creosol is probably attributable to the xylenols and the ethyl guaiacol; if one can transfer the figures for para-ethyl-phenol to the ortho compound this would also enhance the bactericidal activity of creosote. Propyl-guaiacol occurs in creosote in too small an amount to be a factor, indeed the U. S. Pharmacopœia gives a test to insure its absence. Butyl-guaiacol has not been reported as a constituent of creosote.

Toxicity.—Tests of the toxicity of (1) two samples of creosote, (2) of guaiacol (both natural and synthetic) and (3) of various fractional distillates of creosote were made upon guinea pigs. The method employed was to determine the M. L. D. by intraperitoneal injections of a 10% solution of the sample in sterile olive oil.

The M. L. D. of two samples of creosote was 0.54 and 0.55 cc. per kilo, respectively; the guaiacols, synthetic and natural, were fatal in doses of 0.55 per kilo. The M. L. D. of the fractional distillates are shown in the following table:

B. P. (° C.)	M. L. D. Cc. per Kilo.	B. P. (° C.)	M. L. D. Cc. per Kilo.	B. P. (° C.)	M. L. D. Cc. per Kilo.
187° C.	0.2–0.3	207–210	Not tested	216–218	0.5–0.6
188–195	0.4–0.5	210–213	0.5–0.6	218–220	0.5–0.6
200–202	0.4–0.5	213–216	0.5–0.6	220–225	0.5–0.6
204–206	0.4–0.5			Whole creosote	0.55

It will be noted that the low boiling fractions are more toxic than the high boiling fractions. Attention may be called to the fact that the fraction distilling at 187° C. (which is below the U. S. P. limit) is twice as poisonous as the whole creosote.

When we compare the bactericidal and toxic powers of the various fractions, the comparative advantages of the higher boiling portions become quite evident.

[1] Coulthard, Marshall and Pyman (6) have reported a phenol coefficiency of 7.5 for para-ethylphenol. Although it is the ortho-ethylphenol which occurs in creosote it is probable that the germicidal powers of the isomers are not widely different.

If we make a table of what we might call "therapeutic efficiency," assuming that the therapeutic value is due to the disinfectant properties, by multiplying the phenol coefficient by the fatal dose (P. C. × M. L. D.) we have the following figures:

TABLE IV.

B. P. (° C.)	Efficiency.	B. P. (° C.)	Efficiency.	B. P. (° C.)	Efficiency.
187° C.	0.56	204–206	1.08	210–219	1.51
188–195	1.08	206–208	1.25	220	1.76
195–202	1.12	208–210	1.37	Entire	1.76
202–204	1.01				

These figures seem to us to indicate strongly that the fractions of creosote boiling above 206° C. are decidedly preferable to the lower boiling fractions, at least as far as it concerns their disinfectant properties.

CONCLUSIONS.

1. Creosote is an active bactericide. The phenol coefficients of various samples ranged from 2.4 to 3.9 for both *Bacillus typhosus* and *Staphylococcus aureus*, with an average of 3.2.

2. Both guaiacol and creosol are less than half as powerfully bactericidal as creosote.

3. No reliable criterion of bactericidal power was observed in any physical property but the high boiling fractional distillates (215–220° C.) were the most efficient.

4. The minimal lethal dose for the guinea pig of either creosote or guaiacol is about 0.55 cc. per kilo intraperitoneally. The high boiling fractions are less toxic than those distilling below 210° C.

5. The dimethyl-phenols (xylenol) and ethyl-guaiacol are more active bactericides than either creosote or guaiacol. It is suggested that the antibacterial efficiency of the high boiling fractions of creosote is due largely to these compounds.

6. Propyl-guaiacol and butyl-guaiacol are very efficient against the *typhoid bacillus* but decidedly less active than creosote against *Staphylococcus aureus*.

7. We believe the quality of creosote would be improved by raising the temperature at which it begins to distil.

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The University of North Carolina has secured the W. W. Ashe Herbarium, a collection very valuable for its large number of type specimens from the southeastern states. William Willard Ashe (1872–1932), a graduate of the University of North Carolina and Cornell University, was the first forester employed by the state of North Carolina. The acquisition of the Ashe Herbarium by the University of North Carolina was made possible through the generosity of George Watts Hill, of Durham, N. C.

THE EFFECT OF RADIO VIBRATIONS ON SOME DRUGS.*

BY DAVID I. MACHT, M.D.

INTRODUCTORY.

It is a matter of common knowledge that ultraviolet rays may profoundly affect various properties of chemicals and drugs. The writer has found, for instance, that exposure to ultraviolet radiation modifies the action of quinine and quinidine sulphates on rats (1). It is also well known that X-rays, radium and radium emanations may produce marked chemical reactions and modify the pharmacological properties of drugs. Thus the author has recently shown that both ordinary ultraviolet radiation and very short ultraviolet rays, designated as X-rays and radium emanations, modify the potency of digitalis tincture (2). Going to the other extreme of the spectrum, it is now known that infra-red radiations may also induce changes in chemicals; and even the rays of the visible spectrum of light, especially when polarized, have been shown by the writer and his co-workers to be capable of influencing the pharmacological properties of various chemical compounds and drugs (3). These facts prompted the undertaking of the present investigation.

Any one in the proximity of a modern radio with a loud speaker may observe that the sounds emitted by the apparatus, especially those of the lower register, cause audible vibrations of china, picture frames and other light articles in the same room. Indeed, these vibrations produced by the loud speaker may actually be transmitted to the floor and felt by persons occupying chairs in the room. The question arises: Can such vibrations induce or hasten reactions in any substance which may be detected by some chemical, physical or biological methods? Inquiry into such a subject may prove to be of practical importance because radios are common adjuncts or articles of furniture in many households of the present day.

The following experiments, undertaken as a preliminary investigation of this problem, were primarily of a practical nature. No attempt was made to analyze or determine exactly what sort of vibrations produced by the radio—whether supersonic waves, ordinary audible sound waves or mechanical vibrations set up by the instrument—were responsible for the results reported here. Such an analysis is reserved for a future detailed study.

METHODS OF EXPERIMENTATION.

The experiments were made with a so-called "baby grand" radio set (one of the best known, latest models), placed on a small wooden table resting on the wood floor. Several chemicals or drugs in ordinary glass test-tubes, clamped to an iron stand on the floor, were placed as closely as possible to the instrument. Care was taken to protect the solutions from light, both direct and indirect, by means of black paper; and control solutions of exactly the same kind were placed in other test-tubes wrapped in cotton wool and inclosed in a large mailing tube left in the same room with the radio. Thus light was eliminated and the temperature of both specimens properly controlled. Periods of exposure to the radio vibrations lasted

* Pharmacological Research Laboratory, Hynson, Westcott & Dunning, Inc., Baltimore, Maryland.

from three to six hours, and sometimes longer. The musical programs used for such experiments included rendition from both wind and stringed instruments and vocal recitals. Whenever possible, symphonic music was the source of sound vibrations.

Five different chemicals or drugs were chosen for study in this research: tincture of digitalis, aqueous solution of Mercurochrome, solutions of physostigmine or eserine salts, solutions of cocaine hydrochloride and benzaldehyde. These widely different drugs were purposely selected in order to take advantage of various methods of detecting possible differences in their chemical composition, on the one hand, and phsyiological action, on the other. The methods of study in some cases were physical, for example, colorimetric comparison or hydrogen-ion determination by means of an electric potentiometer; in other cases, purely chemical quantitative methods were employed, for example, determination of metallic mercury; and special pharmacological methods were used in case of digitalis and cocaine because, as is well known, certain changes in chemical constitution can be more readily detected by extremely sensitive biological tests than by the methods of physics and chemistry (4).

DIGITALIS.

Digitalis was the first drug chosen for experimentation because of its importance in medicine and because, as is well known, all its preparations, including the tincture, undergo a change in potency on standing. Since such changes cannot be followed satisfactorily by any chemical test and the potency of digitalis preparations must be studied by biological methods, numerous experiments were made with various tinctures exposed to radio vibrations. Each tincture employed was divided into two portions, one used as a control and the other exposed to radio vibrations. The control was always kept in the same room with the radio to eliminate any difference that might be ascribed to variations in temperature. After exposure of the one portion to radio vibrations, both specimens were assayed or compared pharmacologically. The methods principally used were the cat method of Hatcher and Brodie, as modified by Rowntree and Macht (5), and the phytopharmacological test described by Macht and Krantz (6). In addition, comparative tests with the specimens were made on goldfish (*Carassius auratus*) and on leeches (*Hirudo medicinalis*).

Two series of cat experiments were performed. In one series, the usual method with intact vagi nerves was employed. In another series, assays were made on animals with both vagi cut because the author has found that when digitalis preparations are assayed on vagotomized cats, the results obtained are not only more uniform but also indicate a greater toxicity of the drug (7). Table I shows the results obtained. It will be noted that in both series there was a difference of

TABLE I.—DIGITALIS ASSAY ON CATS.

Specimen.	Number of Cats.	Vagi.	Minimum Lethal Dose (Average).
Normal or control	7	Intact	10.1 cc. of 1:10 solution
Exposed to radio vibrations	7	Intact	10.6 cc. of 1:10 solution
Normal or control	8	Cut	7.4 cc. of 1:10 solution
Exposed to radio vibrations	8	Cut	7.9 cc. of 1:10 solution

0.5 cc. in the minimal lethal dose between the control and the specimen exposed to

radio vibrations. Phytopharmacological comparisons revealed a much greater difference between the "radio" and control specimens. The results obtained in sixteen experiments are exhibited in Table II.

TABLE II.—PHYTOPHARMACOLOGICAL EXPERIMENTS WITH DIGITALIS, 1%, ON LUPINUS ALBUS.

Number.	Experiment.	Phytotoxic Index of Normal or room control.	Phytotoxic Index of Specimen exposed to radiations.
1	December 14	76%	83%
2	December 15	52%	62%
3	December 21	56%	69%
4	December 22	44%	57%
5	June 8	42%	54%
6	June 9	64%	59%
7	June 13	50%	57%
8	July 5	61%	76%
9	July 6	57%	67%
10	July 11	58%	71%
11	July 18	50%	72%
12	July 20	58%	78%
13	August 29	50%	63%
14	September 1	76%	81%
15	September 5	64%	92%
16	September 22	51%	66%

Each specimen of tincture was tested on eight or ten seedlings of *Lupinus albus* suspended in a one per cent solution of the tincture in plant-physiological saline; and the index of growth, or phytotoxic index, as compared with that of seedlings in normal physiological solution, is expressed in percentages. It will be noted that there was usually a difference of 10 per cent, and often more, between the controls and the treated specimens.

In addition to the cat and plant experiments, comparative tests were made on goldfish with a 2 per cent solution of the tinctures. Here again, a difference in toxicity was noted between the "radio" and control specimens, as shown by the following protocol:

ASSAY ON CARASSIUS AURATUS.

Specimen of Digitalis Tincture, 2%.	Fish Paralyzed in
Normal or control	6 minutes
Exposed to radio vibrations	10 minutes

In connection with pharmacological studies made on leeches in this laboratory, the author had occasion to test the toxicity of digitalis on these interesting animals. It was found that from 2 to 4 per cent solutions of digitalis tincture produced gradual paralysis of these worms. By employing this method in the present investigation, the author found again a definite difference between the "radio" and control specimens of tincture of digitalis, as illustrated by the following protocol:

ASSAY ON HIRUDO MEDICINALIS.

Specimen of Digitalis Tincture, 4%.	Leech Paralyzed in
Normal or control	22 minutes
Exposed to radio vibrations	30 minutes

MERCUROCHROME.

One of the valuable and striking properties of Mercurochrome, or dibrom-oxy-mercuri-fluorescein, is its great chemical stability. Solutions of this antiseptic, allowed to stand in the laboratory for months and even years, undergo no decomposition (8). It has been found that even exposure to the ultraviolet rays of a mercury lamp produces no breakdown of this compound (9). When mercury solutions are mixed with strong solutions of dextrose, however, the compound undergoes a slowly progressive reduction with precipitation of metallic mercury. A mixture of the drug with dextrose or glucose forms a less toxic dose for intravenous injection in animals, including man, than an aqueous solution of Mercurochrome but, because of the slow reducing process, it is advisable to prepare such mixtures immediately before their clinical administration to patients (10). Because of this slow chemical reduction brought about by the addition of large quantities of glucose to aqueous Mercurochrome solutions, such mixtures were selected for the study of the effects of radio vibrations. A solution of 5 per cent Mercurochrome, containing from 5 to 10 per cent of glucose, was prepared and divided into two parts. One fraction was exposed to the vibrations of the radio, while the other was used as a control. After the former had been exposed for a number of hours, the specimens were compared in regard to their chemical composition and also in respect to their pharmacological properties. The results obtained were very striking.

A quantitative determination of the rapidity of reduction of Mercurochrome was made by measuring the amount of metallic mercury precipitated from a given quantity of the solution. The author is indebted to Dr. Wilton C. Harden for the chemical analyses made in connection with this work. The subjoined protocol strikingly illustrates the results obtained. Three test-tubes, each containing 10 cc. of a 5 per cent solution of Mercurochrome with 10 per cent of glucose, were exposed to radio vibrations; and three others, filled with the same solution, were used as controls. The amount of metallic mercury precipitated in each of the test-tubes during six hours' exposure is shown in the protocol. It will be noted that a larger amount of metallic mercury was precipitated in all the exposed specimens than in the three controls. The results clearly indicate an acceleration of the reduction process in the specimens exposed to radio vibrations.

TABLE III.—EXPERIMENTS WITH MERCUROCHROME—QUANTITATIVE DETERMINATION OF METALLIC MERCURY. (February 17, 1932.)

Control Fraction.	Grams of Metallic Mercury in 10 cc. of Solution.	Fraction Exposed to Radio Vibrations.	Grams of Metallic Mercury in 10 cc. of Solution.
No. 1	0.0533	No. 1	0.0749
No. 2	0.0551	No. 2	0.0727
No. 3	0.0566	No. 3	0.0744

The two series of specimens described above were centrifugalized and filtered. The filtrates were then tested pharmacologically for their effect on growth of Lupinus seedlings as the writer has found this method useful in comparing the toxicity of various specimens of Mercurochrome (11). The phytopharmacological test also revealed a distinct difference between the exposed specimens and the controls, which is illustrated by the following protocol. Inasmuch as no mercury

was precipitated in the fraction exposed to radio vibrations, the supernatant fluid of this specimen was found to be less toxic than that of the control solution.

EXPERIMENT. (February 17, 1932).

Supernatant fluid of fraction exposed to radio vibrations, tested on *Lupinus albus* seedlings in a 1:5000 solution, gives a phytotoxic index of 58 per cent.

Control gives phytotoxic index of 40 per cent.

BENZALDEHYDE.

A fresh specimen of chemically pure benzaldehyde was used for further study of radio vibrations. It is well known that benzaldehyde, on exposure to air, slowly undergoes oxidation with the formation of benzoic acid. A fresh specimen of benzaldehyde was divided into two parts. One portion was exposed to radio vibrations, while the other was kept as a control. After exposure of one fraction for a number of hours, the two specimens were titrated by Dr. W. C. Harden to determine the amount of oxidation which had taken place in each. It was discovered that the specimen which had been exposed to radio vibrations required more sodium hydroxide to neutralize its acidity (in other words, a larger quantity of benzoic acid was found therein) than did the control. The following protocol illustrates these findings.

EXPERIMENT WITH BENZALDEHYDE. (April 27, 1932.)

Control Specimen:

3.0 cc. of benzaldehyde requires 72.6 cc. of *N*/50 sodium hydroxide to be neutralized, which corresponds to 5.6 per cent of benzoic acid, $C_6H_5.OH$.

Specimen Exposed to Radio Vibrations:

3.0 cc. of benzaldehyde requires 81.0 cc. of *N*/50 sodium hydroxide to be neutralized, which corresponds to 6.2 per cent of benzoic acid, $C_6H_5.OH$.

PHYSOSTIGMINE.

It is well known that solutions of physostigmine or eserine salts undergo a gradual change on standing even in the dark. They become pink or red in color through formation of a substance known as Rubreserin. The writer prepared solutions of eserine sulphate, 1:1000, in water and exposed them to radio vibrations. After from five to six hours' exposure, the color intensity of the specimen was compared with that of the control. It was found that the former had a distinctly deeper red color, indicating more rapid decomposition of the drug. The two solutions were then compared in respect to their myotic action on the pupil of the cat's eye. It was found that the darker solution (the one exposed to radio vibrations) was less effective in producing myosis than the control. Similar differences in pharmacological action were noted when the two specimens were compared on surviving intestinal segments of the cat.

COCAINE.

Cocaine and its salts are admirably adapted for the study of their keeping qualities or stability because their chemical structure and decomposition products are well known. The cocaine molecule is broken down by hydrolysis into three components, methyl alcohol, benzoic acid and a nitrogenous base known as ecgonin. These compounds do not exhibit the pharmacological properties of the cocaine

molecule in any way, neither do physical mixtures of the three produce the same physiological results effected by their chemical combination in the form of the cocaine molecule, with respect to influence on the nervous system (12) or muscular activity (13).

Solutions of cocaine hydrochloride, 0.2 and 0.1 per cent, were employed in the present study on the effect of radio vibrations. These were exposed according to the procedure described above and compared in various ways with the controls. Comparative tests were made in regard to the local anesthetic properties of the two solutions for frog's skin and the rabbit's eye. A more quantitative comparison of the two specimens was also made by taking advantage of the peculiar phytopharmacological properties of cocaine and its products of decomposition. Macht and Livingston (14) have demonstrated that, while cocaine itself is not very poisonous, some of its decomposition products, and more particularly benzoic acid, are very toxic for living plant protoplasm. It was found, for instance, that sodium benzoate, even in concentrations of 0.004 per cent, produces a marked inhibition in the growth of *Lupinus albus* seedlings. Specimens of cocaine hydrochloride, which had been exposed to radio vibrations, were compared with controls in regard to this effect on the growth of *Lupinus albus*. It was found that the exposed specimens were more toxic for plants than the control solutions. This indicated a greater decomposition in the former than in the latter, the increased toxicity being due to the presence of a larger amount of benzoic acid or benzoate in the exposed specimen as a result of decomposition. The following protocol illustrates these phytopharmacological findings.

TABLE IV.—EFFECT OF SOLUTIONS OF COCAINE HYDROCHLORIDE ON GROWTH OF LUPINUS ALBUS.

Experiment of.	Concentration.	Phytotoxic Index of Control specimen.	Phytotoxic Index of Specimen exposed to radio vibrations.
December 15, 1931	1:2000	81%	70%
December 21, 1931	1:1000	91%	64%
December 22, 1931	1:2000	55%	50%
March 4, 1932	1:2000	92%	73%

Zoöpharmacological experiments also proved that the control solutions of the cocaine hydrochloride were more anesthetic for frog's skin and for the conjunctiva of the rabbit's eye than those exposed to radio vibrations, thus corroborating the evidence already adduced as to the greater decomposition of the latter. Finally, a hydrogen-ion determination of the two solutions was made. It was found that the two specimens no longer possessed the same hydrogen-ion concentration. Thus the control solution gave a p_H of 4.4 while that exposed to radio vibrations gave a p_H of 3.8. This difference in the hydrogen-ion concentration again corroborated the evidence given by the other tests in regard to the more rapid decomposition of the exposed specimen.

COMMENT.

In 1927 Wood and Loomis described some physical and biological effects of high frequency sound waves of great intensity (15). These investigators studied sound waves of high frequency and great intensity, which were generated in an oil-bath by a piezo-electric oscillator of quartz, operated at 50,000 volts and vi-

brating 300,000 times a second. They noted certain heat and searing effects and liberation of gases dissolved in water; also destructive effects on spirogyra, small fishes and frogs. Harvey and Loomis, in a later work (16), described the effects of high frequency sound waves of small intensity in relation to their biological effects on cells of Elodea and Nitella. Further work concerning the effects of high frequency sound waves on protoplasm was carried on by Schmitt, Olson and Johnson (17), who developed a technique for supersonic micro-manipulation. More recently, Hsien Wu and Szu-Chih Liu reported further experiments concerning the effect of supersonic waves on protoplasm (18). A valuable contribution concerning the purely chemical effects of high frequency sound waves first described by Wood and Loomis was published by Richards and Loomis (19). They demonstrated that intense high frequency compressional waves produced certain chemical effects, "especially discharging metastable systems of great sensibility." They found that such waves expel gases from liquids and accelerate certain well-known chemical reactions. So far as the writer has been able to learn, no experiments have been recorded regarding the effects of high frequency and supersonic sound waves on drugs; certainly the effects of vibrations or oscillations emitted by the radio on the pharmacological properties of medicinal agents have not been described before, and the present communication is the first one of that type. The results obtained by the writer with solutions of the five drugs studied by various physical, chemical and biological methods are so clear-cut as to establish beyond doubt that the sounds or vibrations produced by the radio with a powerful loud speaker may accelerate chemical changes in solutions of drugs which are measurable by physicochemical or pharmacological tests. No experiments have yet been made with drugs in solid form. The author wishes to reiterate that so far he has not determined which vibrations or waves—whether supersonic or audible sound waves or mechanical vibrations—are responsible for these changes. Such an analysis is a fascinating subject for further research. The present findings, however, are obviously of practical importance in connection with the keeping qualities of drugs. It is hoped that the present study will stimulate further investigation in this field.

SUMMARY.

1. Solutions of five different drugs were exposed to the sounds or vibrations of a radio by being placed in close proximity to the loud speaker.

2. After exposure to such vibrations for several hours, these drugs were compared with control specimens of the same solutions by means of chemical, physical and biological tests.

3. It was found that the specimens exposed to radio vibrations had undergone greater chemical change than the control solutions.

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(18) Hsien Wu and Szu-Chih Liu, *Ibid.*, 28 (1931), 782.
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STUDIES ON THE PREPARATION, TOXICITY AND ABSORPTION OF BISMUTH COMPOUNDS. IV. BISMUTH COMPOUNDS OF THIOGLYCOLLIC ACID.*

BY W. M. LAUTER, A. E. JURIST AND W. G. CHRISTIANSEN.

Very little information is available in the literature concerning the toxicity and absorption of sodium bismuth thioglycollates. Harden and Dunning (1) have described the preparation of bismuth thioglycollamide but no data has been published on its toxicity and absorption. A little clinical data is available concerning a market preparation of sodium bismuth thioglycollate but no detailed comparison of the biological characteristics of this and other bismuth compounds has been made. It was the purpose of this investigation to compare bismuth thioglycollates and other bismuth compounds already discussed in previous publications as to their relative toxicity and absorption, as well as to describe their preparation.

Three bismuth derivatives of thioglycollic acid have been prepared: (1) Sodium Bismuth Thioglycollate; (2) Ethyl Thioglycollate; and (3) Bismuth Thioglycollate Triamide.

Of the three bismuth compounds prepared, only two were subjected to biological tests. Both of these were examined as regards their toxicity and absorption in the same manner as those previously discussed. They were injected intramuscularly into albino rats. The absorption was studied by determining quantitatively the unabsorbed bismuth still remaining at the site of injection while the toxicity was estimated from the growth curves of the rats injected. The results obtained are given in the following table. Owing to the slight solubility of bismutho thioglycollamide in water it was necessary to inject it in glycerin solution.

Compound Injected.	Medium for Injection.	Dosage Injected— Mg. Bi/Kg. Body Weight.	Approximate Maximum Tolerated Dose— Mg./Kg. Body Weight.	Per Cent Absorption.
Sodium bismuth thioglycollate	Water	15	Less than 30	38% in 27 days
Bismuth thioglycollamide	Glycerin	50	Less than 50	82% in 3 hours

These two compounds are both more toxic than the bismuth compounds of the fatty acids, the bismuth tartrates, and the iodobismuthates of quinine and

* Scientific Section, A. PH. A., Toronto meeting, 1932.

procaine. They are, however, of the same order of toxicity. They are widely different in absorption since the bismuth thioglycollamide was 82% absorbed in three hours whereas sodium bismuth thioglycollate was only 38% absorbed in twenty-seven days. This latter is unusual in view of the fact that the water-soluble bismuth compounds are usually very rapidly and completely absorbed. Thus, the water-soluble bismuth tartrates are almost completely absorbed in seventy hours. The only basis on which this can be explained is that the sodium bismuth thioglycollate is decomposed into an insoluble bismuth compound when injected which is no more readily absorbed than the bismuth salts of the fatty acids.

From these results there is some evidence that sodium bismuth thioglycollate should give uncertain therapeutic results but the thioglycollamide might, because of its rapid absorption, give more reliable results.

EXPERIMENTAL PART.

Preparation of Sodium Bismuth Thioglycollate.—8.1 Gm. of thioglycollic acid were dissolved in 100 cc. of water and neutralized with sodium carbonate. Then 11.5 Gm. of bismuth hydroxide were added and the whole was boiled until the bismuth hydroxide was dissolved. The solution was clarified and evaporated until an oil separated out. This oil was washed with three volumes of alcohol repeatedly until a solid was obtained. The solid was then washed with ether and dried. The yellow powder was readily water soluble.

Calculated for $(NaCO_2CH_2S)_2BiOH$: Bi—46.2%; S—14.2 %; Na—10.17%.
Found: Bi—42.9%; S—14.42%; Na— 9.0 %.

Preparation of Ethyl Thioglycollate.—50 Gm. of thioglycollic acid were mixed with 50 Gm. of absolute alcohol and 3 cc. of concentrated sulphuric acid. After boiling for two and one-half hours under a reflux an oil was obtained free of alcohol. This was shaken with water to remove sulphuric acid and dried *in vacuo* over phosphoric anhydride. The entire operation was carried out in an atmosphere of carbon dioxide to prevent oxidation to the disulphide.

Calculated for $HSCH_2CO_2C_2H_5$: S—26.7%; Found: S—23.4%.

This showed the presence of some alcohol in the oil but this could be disregarded for the purposes of this experiment.

Preparation of Ethyl Bismutho Thioglycollate.—36 Gm. of ethyl thioglycollate were treated with 26 Gm. of bismuth hydroxide following the method of Abel and Rowntree (2) in preparing the analogous antimony compound. The hydroxide was added in 2-Gm. portions as much heat was evolved. The oil was allowed to stand over night in the dark and was then freed from unreacted bismuth hydroxide and a trace of bismuth sulphide by filtration on a Buchner funnel. It was then dried *in vacuo* over phosphoric anhydride.

Calculated for $Bi(SCH_2CO_2C_2H_5)_3$: Bi—36.91%; S—16.99%.
Found: Bi—38.2 %; S—16.86%.

Preparation of Bismutho Thioglycollate Triamide.—An alcohol solution of ethyl bismutho thioglycollate was treated with ammonia gas dried by passing it over soda lime. Eventually an oil separated from the alcohol solution. The mixture was cooled and the ammonia bubbling was continued for one hour more. Then the flask was sealed and allowed to stand at room temperature for 48 hours. The

oil turned into a yellow solid which was freed of the mother liquor by decantation. This solid was contaminated by bismuth sulfide so that it was recrystallized from hot water. The yellow crystals obtained were very slightly soluble in cold water, soluble in hot water and glycerin.

Calculated for $Bi(SCH_2CO_2NH_2)_3$:	Bi—43.6%; S—20.1%; N—8.7%.
Found:	Bi—45.6%; S—20.58%; N—8.0%.

The biological tests on these compounds were carried out in the Biological Laboratories of E. R. Squibb and Sons, New Brunswick, N. J.

(1) Harden and Dunning, *J. Am. Chem. Soc.*, 49 (1927), 1017.
(2) Abel and Rowntree, *J. Pharmacol. & Exper. Therap.*, 2 (1910), 11.

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PHYTOCHEMICAL NOTES.*

No. 108. THE NON-HEPTANE CONSTITUENTS OF JEFFREY PINE OIL.

BY C. W. SONDERN.

Early in 1927 an understanding was reached with Dr. Graham Edgar of the Ethyl Gasoline Corporation of Yonkers, N. Y., in accordance with which a large amount of Jeffrey pine oil was to be sent to the Wisconsin Pharmaceutical Experiment Station for rectification of its principal constituent, the heptane. The non-heptane constituents were to be used for further investigation of these substances, whereas the heptane fraction was to be forwarded to Yonkers for the study of the standardization of gasoline as fuel in internal combustion engines. The Jeffrey pine oil was produced in California during the summer of 1927 as a coöperative enterprise between the Ethyl Gasoline Corporation, the local representative of the Bureau of Forestry, and a third party, the Chemical Corporation of California. The material, four drums in all, was received at Madison, in the fall of the same year.

The materials obtained in the separation of the heptane fraction from the Jeffrey pine oil may, for the sake of convenience, be grouped in the following manner:

I. The aqueous cohobate.
II. Oily fractions distilling below the b. p. of *n*-heptane ("Vorlauf").
III. The heptane fractions forwarded to the Ethyl Gasoline Corporation.
IV. Oily fractions distilling above the b. p. of *n*-heptane after removal of the aldehydes by shaking them with hot conc. $NaHSO_3$ solution.
V. The oily aldehydes regenerated from the sodium acid sulphite addition products.[1]
VI. Some resinous materials from drums and still which were discarded.

I. Examination of the Aqueous Cohobate.—The aqueous distillates collected in connection with the various fractionations in the first distillation of the Jeffrey pine oil were combined and concentrated. The original volume of nine gallons was distilled and the first third retained. This fraction was neutralized with barium carbonate and evaporated to three liters in a large still. The filtrate was further concentrated in an evaporating dish to one hundred cc. when the concentrate was

* From the Laboratory of Edward Kremers.

[1] P. A. Foote, JOUR. A. PH. A., 18 (1929), 350.

placed in a vacuum desiccator over KOH until dry. The resulting residue was washed from the dish with 1 p. c. nitric acid and filtered. The filtrate was treated with silver nitrate. The precipitated silver salt having been washed and dried was heated and the residual silver weighed. 0.1923 Gm. of silver salt, dried at 110°, yielded 0.1128 Gm. of metallic silver.

The silver content as computed for the following silver salts is:

		Found.
For Ag acetate	65.18 p. c.	
For Ag propionate	59.64 p. c.	58.60
For Ag butyrate	55.36 p. c.	

II. Examination of the Constituents Boiling Below the B. P. of n-Heptane.—From the Report on the Rectification of Crude Jeffrey Pine Oil,[1] it becomes apparent that the "Vorlauf" of the four drums was collected separately and in somewhat different amounts. Whereas for the purpose of the report referred to approximations were deemed sufficient, the more accurate amounts are herewith recorded, also the density of each.

	Amount.	$d_{25.5°}$
Vorlauf from drum I	700 cc.	0.6846[1]
Vorlauf from drum II	750 cc.	0.6770
Vorlauf from drum III	750 cc.	0.6770
Vorlauf from drum IV	3800 cc.	0.6780
Total	6000 cc.	

[1] The higher density is due to drippings from the condenser left from higher fractions previously distilled.

For the sake of convenience I and II were mixed for fractionation, also III and IV.

Fractionation of III and IV.—In order to neutralize any acid that might be present 10 Gm. of sodium carbonate were added to the mixed portions and the mixture fractionated with the following results:

No.	B. P.	Vol.	$d_{25.5°}$
1	–85°	60 cc.	0.6735
2	85–90°	178 cc.	0.6790
3	90–92°	307 cc.	0.6780
4	92–95°	950 cc.	0.6770
5	95–96°	1000 cc.	0.6780
6	96–97°	1000 cc.	0.6785
7	97–98°	125 cc.	0.6789

Lots I and II were then introduced into the still and the fractionation continued with the following results:

No.	B. P.	Vol.	$d_{25.5°}$
8	–75°	200 cc.	0.6919[1]
9	75–80°	99 cc.	0.6890
10	80–86°	104 cc.	0.6835
11	86–90°	178 cc.	0.6800
12	90–92.5°	185 cc.	0.6790
13	92.5–94.5°	425 cc.	0.6778
14	94.5–95.5°	425 cc.	0.6785
15	95.5–97°	468 cc.	0.6789
16	97–98°	266 cc.	0.6790

It becomes apparent that these fractions consist in large part of *n*-heptane (b. p. 98.4°) as was to be expected. However, the lower boiling points of practically all of the fractions suggest the presence of other substances. In order to isolate these, another fractionation was resorted to. Although the fractions recorded above do not agree, it is easy enough to select corresponding fractions to be mixed for the next fractionation. Thus Fractions 8 and 9 were mixed and distilled into five fractions. At this point the distillation was stopped and Fraction 10 was added, and three more fractions were collected before the Fractions 1, 2 and 11 were added. In this manner nine fractions (1–6, 9, 10, 11) distilling below 85° were obtained.

Inasmuch as some of the thirteen fractions of the next table were found to contain appreciable amounts of water-soluble material, this was removed by shaking the oil with small amounts of water in a stoppered graduated cylinder until the volume was no longer appreciably reduced. The densities of the oily fractions before and after shaking with water are recorded, also the percentage of water-soluble constituents.

No.	Distillation Range.	d_{25} I Before Washing.	II Washed.	Percentage of Water-Soluble Constituents.
Fractions 8 and 9 (b. p. 75° and —75–80°) yielded on fractionation:				
1	–57°	0.7275	0.6735	46.7 p. c.
2	57–57.5°	0.7365	0.6745	46.4 p. c.
3	57.5–58.5°	0.7355	0.6750	48.6 p. c.
4	58.5–70°	0.7268	0.6780	40.0 p. c.
5	70–85°	0.6880	0.6780	8.8 p. c.
At this point Fraction 10 was added. (B. p. 80–86°.)				
6	–85°	0.6760	0.6775	18.1 p. c.
7	85–87°	0.6770	0.6755	1.5 p. c.
8	Residue	0.6785	Same	..
Now the still was refilled with Fractions 1, 2 and 11. (B. p. 85°, —85–90° and 86–90°.)				
9	–65°	0.7760	0.6750	33.7 p. c.
10	65–70°	0.6915	0.6735	27.3 p. c.
11	70–85°	0.6840	0.6750	6.5 p. c.
12	85–90°	0.6775	0.6755	1.9 p. c.
13	Residue	0.6775	....	..

The aqueous solution of the water-soluble constituents was deprived of much of its water by means of anhydrous copper sulphate and the volatile organic substances were distilled over on a sand-bath at a temperature below 98°. About 100 cc. of distillate were thus obtained. This distillate was further dehydrated with anhydrous copper sulphate and fractionated. The fractions and their densities are herewith recorded:

Fraction.	B. P.	$d_{20°}$
1	55–60°	0.7960
2	60–61°	0.8004
3	61–65°	0.8050
4	65–70°	0.8056
5	70–75°	0.8171

Identification of Acetone.—This ketone boils at 56.3° and has a density of 0.7900 at 25°. Its presence in Fraction 1 was established by

1. By the iodoform test.
2. As dibenzylidene acetone, which was obtained in yellow crystals melting at 108°, when recrystallized at 109°. The recorded m. p. is 111–112°.
3. By sodium nitroprusside test which yielded the characteristic violet color reaction.

Identification of Methyl Alcohol.—This alcohol boils at 64.7° and has a density of 0.7980 at 15°. Its presence in Fractions 3 and 4 could not be established.

The following tests were applied:

1. The methyl salicylate test was not successful because any odor thereof was covered by that of other volatile constituents.
2. With 3,5-dinitrobenzoic acid crystals were obtained which melted at 81–82°, and upon recrystallization at 86°. The methyl ester melts at 107.5°. (See ethyl ester.)
3. By oxidation with a hot copper wire and subsequent treatment with resorcinol-sulphuric acid, the test yielded the characteristic red flocks. (Possibly due to formaldehyde present as such.)

Identification of Ethyl Alcohol.—With 3,5-dinitrobenzoic acid Fraction 5 yielded crystals which melted at 92–93°. This is the recorded melting point for the ethyl ester.

Identification of Aldehydes.—All fractions yielded a positive test with Schiff's reagent. Fraction 3 gave a semicarbazone melting at 125–126°. Isobutyric aldehyde semicarbazone melts at this temperature.

Fraction 1 was tested by means of the resorcinol-sulphuric acid test and produced the characteristic red flocks indicating the presence of formaldehyde.

As was to be expected, only insignificant traces of these water-soluble substances were isolated. From their coefficient of distribution between water and heptane, by far the larger proportions have, no doubt, been discarded with the aqueous distillate in the steam distillation of the volatile oil from the oleoresin. Though of little if any technological significance, it would be worth while biochemically to cohobate the aqueous distillate if the production of Jeffrey pine oil is again undertaken on a large scale.

Analysis of Water-Insoluble Fractions.—Fractions 1–6 and 9–11 from which the water-soluble constituents had been removed were combined and fractionated as follows:

No.	B. P.	Vol.	$d_{20°}$
1	–85°	22 cc.	0.6713
2	85–90°	20 cc.	0.6721
3	90–95°	42 cc.	0.6752
4	95–97°	86 cc.	0.6784
Residue			

All the fractions failed to give Schiff's test for aldehydes.

Ten-cc. portions of the oily Fractions 1 and 3 were acetylated, washed with NaCl solution until free of acid and dried over anhydrous sodium sulphate. Two samples of each fraction of acetylized oil were saponified with standard alcoholic potassium hydroxide. The resulting saponification number was zero, thus indicating the absence of alcohols and esters. It, therefore, appears that the residual oil consists entirely of hydrocarbons, chiefly *n*-heptane.

Better conditions are founded on yesterday's experiences.

THE ASSAY OF NITROGEN MONOXIDE.*

BY JOHN C. KRANTZ, JR., WILLIAM F. REINDOLLAR AND C. JELLEFF CARR.

INTRODUCTION.

The tenth revision of the United States Pharmacopœia gives neither purity rubric nor assay for nitrogen monoxide. In 1912 Smith and Leman (1) examined four commercial samples of nitrogen monoxide and found the percentage of purity to vary between 93.4 and 96.1 per cent. However, in a personal communication from one of the large manufacturers of the gas the authors learned that samples extant on the market contained sometimes as much as 20 per cent of nitrogen. Hackh (2) in 1924 urged the revision committee of the Pharmacopœia to increase the stringency of the purity tests for the compound and include an assay for it. This was neglected. Very recently Chaney and Lombard (3) devised an assay method based upon washing the nitrous oxide with water saturated with air. Hackh also urged the introduction of the Bureau of Mines (4) test for the higher oxides of nitrogen and a simple solution in water test as an assay. The former test depends upon the fixation of the higher oxides of nitrogen with sodium hydroxide and the subsequent oxidation to the pentavalent state by means of hydrogen peroxide. The nitrate is then quantitatively determined colorimetrically with phenoldisulphonic acid. In the assay recommended, running tap water was passed through a column of the gas for ten minutes and the undissolved gas measured, making the necessary corrections for the air dissolved in the water.

It is well known that the accepted method of analysis for nitrogen monoxide depends upon the explosion of a definite volume of the gas with hydrogen and measuring the residual nitrogen. This method requires considerable practice and skill to operate successfully. In an effort to obtain a method more readily adaptable to Pharmacopœial purposes, this work was conducted.

EXPERIMENTAL.

Nitrogen monoxide is soluble in water to the extent of 1.3 cc. in 1 cc. at S. T. P. (5). It is about four times more soluble in alcohol. An effort was made to devise an assay depending upon the differential solubility of nitrogen monoxide and its usual impurities (mixtures of O_2 and N_2) in alcohol (6) and in dehydrated alcohol. These methods were not successful on account of the solubility of the impurities in the solvent. More concordant results were obtained using water at 0° C. as the solvent.

The following analytical procedure was adopted.

ASSAY.

Place in a 100-cc. calibrated nitrometer, provided with a two-way stop-cock and two-way outlet, and properly connected with a balancing tube, a sufficient quantity of mercury. Connect one of the intake tubes of the nitrometer with a gas pipette of about 150 cc. capacity. Boil a sufficient quantity of distilled water to fill the gas pipette allowing a liberal supply for replenishing. Introduce the water into the pipette while still hot avoiding contact with air as far as possible. Place the pipette in a water-bath at 0° C. When the water in the pipette reaches 0° C., reduce the pressure in the nitrometer tube and open the stop-cock controlling the connection with the

* Scientific Section, A. PH. A., Toronto meeting, 1932.

gas pipette. Draw the water (free from air bubbles) through the capillary opening, connection and stop-cock opening in the nitrometer. Close the stop-cock. Having filled completely the nitrometer, other stop-cock opening and intake tube with mercury, reduce the pressure in the bulb and introduce exactly 100 cc. of nitrogen monoxide measured at atmospheric pressure and 25° C. from the cylinder which must be in a horizontal position. Close the stop-cock. Increase the pressure of the nitrogen monoxide in the nitrometer tube and open the stop-cock controlling the connection with the gas pipette. Force the entire volume of gas into the pipette. Close the stop-cock, maintain the pipette at 0° C. and rock rapidly, shaking the water in contact with the gas as far as possible. Keep the pressure bulb of the gas pipette completely filled with boiled distilled water reduced to 0° C. After about thirty minutes most of the gas is dissolved by the water. At this point, to facilitate the solution of the last portion of the gas, draw some of the liquid into the nitrometer tube and force the residual gas back upon the surface of the liquid in the pipette. Continue agitation until the volume of gas which remains does not change in volume after three consecutive agitations of at least 2 minutes each. The residual gas, if any, is drawn into the nitrometer tube and the volume measured immediately at atmospheric pressure.

Not more than 3 cc. of gas remains, corresponding to not less than 97 per cent by volume of N_2O.

RESULTS.

1. Sample prepared through the courtesy of the Ohio Chemical Company, analyzed and found to contain 99.9 per cent N_2O.

Solution Method 99.5 per cent N_2O.

2. Sample prepared through the courtesy of the Ohio Chemical Company, mixed with nitrogen, analyzed and found to contain 90.9 per cent N_2O.

Solution Method 89.8 per cent N_2O
88.0 per cent N_2O
88.6 per cent N_2O.

3. Sample prepared through the courtesy of the Ohio Chemical Company, mixed with nitrogen, analyzed and found to contain 94.3 per cent N_2O

Solution Method 93.0 per cent N_2O
92.7 per cent N_2O.

4. Sample prepared through the courtesy of the Ohio Chemical Company, mixed with nitrogen, analyzed and found to contain 86.1 per cent N_2O.

Solution Method 83.2 per cent N_2O.

5. Sample was a mixture of 90 volumes of 99.9 per cent N_2O and 10 volumes of air.

Solution Method 89.0 per cent N_2O
90.0 per cent N_2O.

6. Sample was a mixture of 95 volumes of 99.9 per cent N_2O and 5 volumes of air.

Solution Method 95.2 per cent N_2O.

7. The following samples of commercial nitrogen monoxide were assayed by the solution method.

A. 97.4, 97.2, 99.2 per cent N_2O
B. 98.2 per cent N_2O
C. 98.0 per cent N_2O
D. 95.6, 93.8 per cent N_2O.

8. A series of determinations was conducted on one commercial sample.

1. 98.0 per cent N_2O
2. 98.0 per cent N_2O
3. 98.6 per cent N_2O
4. 98.2 per cent N_2O
5. 98.6 per cent N_2O
6. 98.2 per cent N_2O
7. 98.2 per cent N_2O
8. 98.4 per cent N_2O
9. 98.2 per cent N_2O
10. 99.1 per cent N_2O

Mean 98.35 per cent N_2O.

The P. E. of a single determination of this series calculated by the simplified formula P. E. $= 0.8453 \frac{\Sigma\eta}{N} = 0.23$ per cent.

CONCLUSION.

1. A method of estimating the approximate purity of commercial samples of nitrogen monoxide has been devised.
2. Several commercial samples have been tested.

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BUREAU OF CHEMISTRY, STATE OF MARYLAND,
DEPARTMENT OF HEALTH.

PHARMACISTS IN THE AUSTRALIAN ARMY.

Correspondence in the Australasian Pharmaceutical Journal.

"In the *Journal* (Australasian Pharmaceutical) for November 12, 1932, page 430, I notice a letter from Mr. H. Long, in which he mentions the position of pharmacist in the British Army. It may be of interest to your readers to know that the pharmacist is recognized in the Australian Forces. I myself hold a commission of O. C., Base Medical Depot, 5th Military District, and the following will show the position of pharmacists in other departments of the Australian Army:

"No dispensing of any description is permitted except by a qualified pharmacist. The rank of staff-sergeant is granted to the dispenser in a field ambulance. In hospitals a pharmacist holds the rank of lieutenant with a staff-sergeant as assistant. The O. C., Base Medical Depot ranks as a lieutenant or captain, and the staff officer of pharmaceutical service is a major. The position generally is very satisfactory, as the whole of the work of supervising equipment, drugs, etc., and all the dispensing, are in the hands of qualified pharmacists. The conditions of service include passing the necessary military examination and holding the qualification."—W. BRENDON GARNER.

Dec. 14, 1932, Perth, Western Australia.

ANTI-OPIUM MESSAGE ISSUED BY MANCHUKUO MINISTER.

On November 30th, a message was issued by the Manchukuo Government in connection with the Anti-Opium Act, to the following effect:

"The habit of opium smoking appears to have taken a deep root among our people. It goes without saying that the habit will cause much wasteful expenditure among the people. It will invite the contempt of foreign nations. It is against the fundamental principle on which our State is founded. Whether we can deal with the problem of opium smoking successfully or not, largely will decide the fate of our national policy. We are now laying the foundation of our State by undertaking various important reforms and by establishing various new systems. It is necessary, therefore, to adopt a fundamental policy regarding opium smoking. It would be a futile attempt to eradicate the habit of opium smoking by disregarding the confirmed addicts Only by a wise and efficient method of controlling this habit among such people can we hope to deal with this big problem with a measure of success."

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THE DETECTION OF ACETONE IN CHLOROFORM.*

BY GEORGE D. BEAL[1] AND CHESTER R. SZALKOWSKI.[2]

PUBLISHED BY PERMISSION OF THE CHAIRMAN OF THE COMMITTEE OF REVISION, U. S. P. XI.

INTRODUCTION.

The U. S. P. X in its monograph on chloroform does not include a test for acetone. It has been suggested that such a test should be included since, as much chloroform is produced from acetone, acetone may be found as an impurity in chloroform; as a result the investigation has been carried out.

Middleton and Hymas (1) employed Nessler's reagent to detect acetone in ether and found it to be satisfactory for small quantities. We have applied it to acetone in chloroform and found it to be equally satisfactory for small quantities of acetone in chloroform. (Since this article was written the British Pharmacopœia, 1932, has appeared, containing a limit test for aldehyde in chloroform with Nessler's reagent.)

Gros (2) found that acetone in dilute aqueous solutions reacts with Nessler's reagent in the cold to give a yellowish precipitate, which on analysis showed the following to be present: mercury, 61.73%; iodine, 27.14%; chlorine, 3.42%, and acetone, 3.94%. We have obtained a canary-yellow precipitate by adding Nessler's reagent to an aqueous solution of acetone and chloroform. The dried precipitate had the following composition: mercury, 72.16%; iodine, 14.85%; chlorine, 3.06%. This precipitate is soluble in an excess of acetone. A dilute aqueous solution of trichlorotertiary butyl alcohol (Chloretone), upon reaction with Nessler's reagent, produced a precipitate similar to that with acetone in chloroform. Both precipitates melted at 235° C. with decomposition, and the two, when mixed intimately, melted at the same temperature.

Kolthoff (3) has used both salicyl aldehyde and vanillin in the presence of solid potassium hydroxide as reagents for acetone. He found that salicyl aldehyde can be applied to ketones other than acetone, while vanillin was specific for acetone.

* Section on Practical Pharmacy and Dispensing, Toronto meeting, 1932.

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On investigation, we found that these tests can be applied to acetone in chloroform to detect about 1 part in 20,000.

The Dutch Pharmacopœia uses the vanillin test for acetone in ether.

Van Slyke's (4) mercuric sulphate test for acetone was applied and proved to be unsatisfactory.

Pittarelli (5) in his experiments found that rubber under the influence of steam or boiling water yields a volatile substance which responds to all tests most characteristic of acetone. This was kept in mind throughout our work. Particular care was taken that the chloroform did not come in contact with any rubber. The reagent furfural used showed a light red or pink color in a blank test, as a result it was redistilled, special care being taken that no rubber stoppers were used. A blank test using the redistilled furfural showed a very slight pink color. Chloroform which had no acetone present but had been in contact with rubber showed a positive test with furfural and with sodium nitroprusside and showed a slight turbidity which might be mistaken for that produced by acetone with Nessler's reagent.

EXPERIMENTAL.

REAGENTS.—*Sodium Nitroprusside:* Dissolve 10 Gm. of reagent sodium nitroprusside in 100 cc. of distilled water.

Mercuric Sulphate: Dissolve 73 Gm. of red mercuric oxide in 1000 cc. of 4 normal sulphuric acid.

Potassium Dichromate: Dissolve 25 Gm. of reagent potassium dichromate in 500 cc. of distilled water.

Barium Hydroxide: A saturated solution.

Ammonium sulphide solution, yellow, Mallinckrodt.

Salicyl aldehyde.

Vanillin, U. S. P.

Mercuric Chloride: Saturated solution.

Nessler's Reagent U. S. P.: Dissolve 10 Gm. of potassium iodide in 10 cc. of distilled water, and add gradually a saturated aqueous solution of mercuric chloride, with constant agitation, until a slight red precipitate remains undissolved. To this mixture add 30 Gm. of potassium hydroxide and after solution has taken place, add 1 cc. additional of the solution of mercuric chloride. Dilute this solution with distilled water to a volume of 200 cc. Allow the precipitate to subside and draw off the clear liquid.

SAMPLES.—*Sample A.* U. S. P. Chloroform.

Sample B. Purified Chloroform. One hundred cc. of chloroform were washed thoroughly with three successive 100-cc. portions of a 10 per cent solution of sodium bisulphite and four 100-cc. portions of distilled water, then dried with anhydrous sodium sulphate and distilled. This procedure was repeated three times.

Sample C. U. S. P. Chloroform for Anesthesia.

Sample D. C. P. Chloroform.

Sample E. Reagent Chloroform.

Sample 1A. U. S. P. chloroform containing one per cent of pure acetone.

Sample 2A. U. S. P. chloroform containing 0.5 per cent of pure acetone.

Sample 3A. U. S. P. chloroform containing 0.1 per cent of pure acetone.

Sample 4A. U. S. P. chloroform containing 0.01 per cent of pure acetone.

Sample 5A. U. S. P. chloroform containing 0.001 per cent of pure acetone.

Sample 6A. U. S. P. chloroform containing 0.0005 per cent of pure acetone.

Sample 7A. U. S. P. chloroform containing 5 per cent of pure acetone.

Sample 1B. Purified chloroform containing one per cent of pure acetone.

Sample 2B. Purified chloroform containing 0.5 per cent of pure acetone.

Sample 3B. Purified chloroform containing 0.1 per cent of pure acetone.

Sample 4B. Purified chloroform containing 0.01 per cent of pure acetone.
Sample 5B. Purified chloroform containing 0.001 per cent of pure acetone.
Sample 6B. Purified chloroform containing 0.0005 per cent of pure acetone.
Sample 7B. Purified chloroform containing 5 per cent of pure acetone.
Sample F. Pure acetone.
Sample G. Cyclohexanone.
Sample GG. Chloroform containing 1 per cent of cyclohexanone.
Sample H. Methyl ethyl ketone.
Sample HH. Chloroform containing one per cent methyl ethyl ketone.
Sample I. Acetophenone.
Sample II. Chloroform containing one per cent acetophenone.
Sample J. Methyl acetophenone.
Sample JJ. Chloroform containing one per cent of methyl acetophenone.

Test I. Sodium Nitroprusside.—To 5 drops of sodium nitroprusside were added 5 cc. of the chloroform sample and the mixture then made alkaline with ten per cent sodium hydroxide. (The nitroprusside solution must be added to the sample before it is made alkaline.) Acetone shows a red or ruby red color.

Test II. Mercuric Sulphate.—Ten cc. of concentrated sulphuric acid and 35 cc. of mercuric sulphate were mixed. To 5 cc. of this mixture were added 5 cc. of chloroform and 1 cc. of potassium dichromate solution and the mixture then gently boiled for three minutes. Acetone gives a yellow precipitate.

Test III. Mercuric Chloride and Ammonium Sulphide.—Ten cc. of chloroform were thoroughly mixed with 10 cc. of distilled water. Five cc. of the water extract were then mixed with 5 drops of mercuric chloride solution. The mixture was then added to 10 cc. of barium hydroxide and filtered. To the filtrate was added one cc. of ammonium sulphide. The presence of acetone is shown by the formation of a black precipitate.

Test IV. Salicyl Aldehyde.—Ten cc. of chloroform sample were thoroughly mixed with 15 cc. of distilled water. Ten cc. of the water extract were heated to 70° C. on a water-bath with one Gm. of solid potassium hydroxide and 10 drops of salicyl aldehyde, allowing the potassium hydroxide to rest on the bottom of the tube. A red ring on the surface of the potassium hydroxide indicates acetone.

Test V. Vanillin.—Ten cc. of chloroform sample were well shaken in a glass-stoppered cylinder with 10 cc. of distilled water, the water layer was separated and to it were added 5 mg. of vanillin and one Gm. of solid potassium hydroxide, then warmed for 15 minutes on a water-bath at 60–70° C. without shaking. The presence of acetone is indicated by an orange or red layer above the potassium hydroxide.

Test VI. Furfural.—Two cc. of chloroform were well shaken with 12 cc. of distilled water. To 6 cc. of the water extract were added 3 cc. of ten per cent solution of sodium hydroxide and 1 cc. of a 10 per cent furfural solution. After standing 10 minutes 1 cc. of this solution was treated with 3 cc. of concentrated hydrochloric acid. A red color indicates acetone.

The furfural used was redistilled two times, care being taken that it did not come in contact with rubber.

Test VII. Nessler's Reagent.—Three cc. of chloroform were shaken with 12 cc. of distilled water in a glass-stoppered cylinder. To 5 cc. of the water extract were added 5 cc. of Nessler's reagent and the mixture shaken. Acetone is indicated by the immediate formation of a white or canary-yellow precipitate.

The results of all of these tests have been assembled in Table I. In this table the appearances of the reactions are indicated by the following legends under the respective tests.

Y = yellow
G = green
N = negative
V. l. p. = very light pink
R = red
L. r. = light red
B. p. = brown precipitate
Bl = black precipitate
C. y. = canary-yellow precipitate
W = white precipitate
Y. p. = yellow precipitate
T = turbid
L. p. = light pink
O = orange
L. o. = light orange

TABLE I.—RESULTS OF TESTS.

Sample.	Test I.	Test II.	Test III.	Test IV.	Test V.	Test VI.	Test VII.
A	Y	G	N	N	N	V. l. p.	N*
B	Y	G	N	N	N	V. l p.	N
C	Y	G	N	N	N	V. l. p.	N*
D	Y	G	G	N	N	V. l p.	N*
E	Y	G	G	N	N	V. l. p.	N*
1A	R	Y	Bl	R	R	R	W
2A	R	Y	Bl	R	R	R	C. y.
3A	Y	Y	Bl	R	R	R	C. y.
4A	Y	N	N	R	L. r.	L. r.	C. y.
5A	Y	N	N	L. r.	L. r.	L. r.	C. y.
6A	Y	N	N	N	N	L. p.	T
7A	R	Y	Bl	R	R	R	W
1B	R	Y	Bl	R	R	R	C. y.
2B	R	Y	Bl	R	R	R	C. y.
3B	Y	N	N	R	O	R	C. y.
4B	Y	N	N	L. r.	L. o.	L. r.	C. y.
5B	Y	N	N	L. r.	L. r.	L. p.	T
6B	Y	N	N	N	N	L. p.	T
7b	R	Y	Bl	R.	R	R	C. y.
F	R	Y	Bl	R.	R	R	N
G	R	Y	Bl	R	N	R	W
GG	Y	B. p.	Bl	R	N	R	C. y.
H	R	Y	Bl	R	N	L. r.	Y. p.
HH	R	B. p.	N	L. r.	N	Y	Y. p.
I	R	B. p.	Bl	R	N	Y	Y. p.
II	L. r.	B. p.	N	R	N	Y	Y. p.
J	L. r.	B. p.	Bl	R	N	Y	C. y.
JJ	L. r.	B. p.	N	L. r.	N	Y	C. y.

* A slight yellowish turbidity appeared after about three minutes, and after standing for one hour or more became dark red.

SUMMARY AND CONCLUSION.

The sensitiveness of a test for acetone may be expressed in terms of the smallest concentration of acetone required to give a just distinctly perceptible reaction.

The sensitiveness of the nitroprusside, mercuric sulphate and mercuric chloride tests is very limited, the colors produced are not very sharp or definite, as a result they could not be used to detect such small quantities of acetone as might be present in chloroform.

The salicyl aldehyde and vanillin tests are sensitive enough to detect one part of acetone in 20,000. The salicyl aldehyde will give a color with other ketones, while the vanillin is specific for acetone.

In our experiments we found that the furfural test is not quite as sensitive as the salicyl aldehyde and vanillin tests but a great deal easier to perform. The purest of reagents must be used to obtain the best results.

The Nessler test is by far the most sensitive for small quantities of acetone, although if acetone is present in more than ten per cent it cannot be detected. A definite canary-yellow precipitate is obtained when the ratio of acetone to chloroform is 1:50,000, while a definite turbidity is still obtained at a concentration of 1:200,000. In performing this test care must be taken to use ammonia-free

water. For small quantities such as may be found in U. S. P. chloroform as an impurity, we prefer this test due to its simplicity.

It will be noted that other ketones give, in the presence of chloroform, a reaction with Nessler's reagent that is similar to the acetone reaction. The colors, however, as a rule are paler, shading toward white. The reaction is therefore not qualitatively positive for acetone, but for ketones in general.

Acetone alone, in water solutions, of less than 5 per cent concentration, will form a permanent white or pale yellow precipitate with Nessler's reagent. Higher aliphatic and aromatic ketones give the reaction in higher concentratons as well.

Aldehydes alone, and in the presence of chloroform, yield by this test an orange precipitate immediately becoming dark red and finally black. Chloroform alone, in aqueous solution, yields after ten minutes, a red turbidity that eventually becomes a red and finally a black precipitate. This action of chloroform alone is due doubtless to alkaline hydrolysis of the chloroform to potassium formate, which subsequently reduces the mercury salt to metallic mercury.

It is believed that the test with Nessler's reagent, with the immediate production of a turbidity or precipitate, is the most satisfactory means of detecting the presence of aldehydes and ketones in chloroform.

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(2) Gros, *Ann. fals.*, 18 (1925), 39–42.
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(4) Van Slyke, *J. Biol. Chem.*, 32 (1917), 455–493.
(5) Pittarelli, *Paliclinico*, 28 (1921), 621; through *J. Am. Med. Assoc.*, 76 (1921), 1803.

August 17, 1932.

PHYTOCHEMICAL TERMINOLOGY.*,[1]

BY EDWARD KREMERS AND COLABORERS.

Terpene.[2,3]

The object of this brief essay is not to define the word terpene, neither to outline a classification of the hydrocarbons known as terpenes. All that is intended is to show the reader who is not a specialist in the field how the word has

* Section on Historical Pharmacy, A. PH. A., Toronto meeting, 1932. See also 21 (1932), 252.

[1] For introductory remarks, see THIS JOURNAL, 21 (1932), 252.

[2] Copies of a first draft of this paper were submitted to a number of persons whose criticism was invited. Without going into details, the reader may be interested in two comments quite opposite in tendency. The first of these is by Dr. Francis D. Dodge. His comments are herewith quoted:

"In regard to the article on 'Terpenes,' the older classifications, based on incomplete knowledge have of course only historical interest. Even Wallach's classification seems to me of doubtful value. For example, Limonene and Dipentene appear at present to be identical in structure.

"The properties given under Limonene could apply only to one compound, not to a group.

"One might set up some such classification as single ring, double ring, triple ring, etc., but I fail to see any advantage in it.

originated and how it has changed its meaning with changes in nomenclature and even within the same system of nomenclature. To the student who endeavors to acquire an insight into the so-called terpene literature this change in the meaning of the word is confusing. Moreover, the confusion is not made clear by any one of the several dogmatic definitions found in textbooks. There is no thought of even indicating to the reader which of the several definitions or modifications thereof he should accept for himself. As for the writer, while he uses the word in its conventional sense as a matter of convenience, he long ago arrived at the conclusion that the group name terpene, however defined, had better be eliminated

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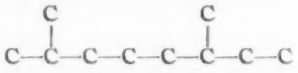
"In my opinion, the term Terpene should be applied to those hydrocarbons $C_{10}H_{16}$, which occur in the volatile oils, and contain the atomic grouping:



which is also characteristic of the open chain, Geraniol-Citral-Linalool group.

"To call all $C_{10}H_{16}$ compounds Terpenes seems to me unnecessary and undesirable.

"Nor does it seem advisable to have the term Terpene cover the $(C_5H_8)_n$ groups.

"I would approve the following classification:

1. Hemi Terpene—C_5H_8—Isoprene (1 member)
2. Terpenes $C_{10}H_{16}$
3. Sesqui-terpenes $C_{15}H_{24}$
4. Diterpenes $C_{20}H_{32}$

"A sub-classification of Terpenes seems unnecessary, and a sub-classification of Sesquiterpenes, which may later be advisable, must be postponed until further knowledge has been accumulated."

As early as 1904 (O. Schreiner, The *Sesquiterpenes*, page 17) and, some years before that date, the writer pointed out the practical results accruing from a classification of the sesquiterpenes according to the configurations

This was years before our present structural knowledge had been acquired in this field. The early adoption of this classification by European chemists, also more recent developments have proven the soundness of the reasoning involved. As a matter of fact even at that time it involved nothing really new but the application, to this group, of well-understood considerations.

[3] The other comment is from the pen of Dr. Eduard Gildemeister. Parts of it are here given:

"In Ihrem Manuskript ueber die Terpene schreiben Sie, dass Beilstein dieses Wort schon frueher gebraucht hat als Kekulé. Nun bleibt aber doch noch die Moeglichkeit, dass der Ausdruck von Kekulé herruehrt. Soweit ich mich erinnere, war auch Wallach dieser Ansicht. Ich vermute, dass Beilstein, ehe er im Jahre 1866 seine Professur am technologischen Institut in Petersburg antrat, in Bonn gearbeitet hat. Als naemlich Beilstein i. J. 1887 das Bonner Laboratorium besuchte, wurde er von Anschuetz als alter Laboratoriumskollege begruesst. Da mag er dann bei seinen Arbeiten das Wort Terpen von Kekulé gehoert haben, das er dann in der von Ihnen erwaehnten Abhandlung gebraucht hat. Ob dem nun wirklich so ist, koennten Sie am besten von Anschuetz, dem alten Mitarbeiter Kekulés, selbst, der jetzt in Darmstadt (Hermannstrasse 16) lebt, erfahren.

"Die Auseinandersetzung darueber, wie die verschiedenen Autoren den Begriff Terpen gefasst und angewandt haben, sind recht interessant, aber auch ziemlich verwickelt, und deshalb ist es dankbar zu begruessen, dass Sie das Problem mit Erfolg in Angriff genommen haben."

from our organic systematics if not from our vocabulary. The individual "terpenes," old style as well as new style, should be considered as representatives of the hydrocarbons at large rationally classified. Such a classification, built upon the ideas of Kekulé, does away with the obsolete terminology of aliphatic and aromatic, and is based on the degree of saturation as its first principle, and secondarily upon the chain or cyclic character of the hydrocarbons.[1]

The German word *Terpen*, Eng. terpene, is no doubt, derived from the German word *Terpentin*, Eng. turpentine, Fr. *térébenthine* and is commonly attributed to Kekulé[2] who is said to have introduced it as a generic term for hydrocarbons $C_{10}H_{16}$ to take the place of such words as terebene,[3] camphene,[4] etc., which,

[1] See E. K. *Classification of Carbon Compounds. Bull. Univ. of Wisc.* No. 528, 1912, reprinted 1924.

[2] The following passage from Kekulé's *Lehrbuch d. org. Chemie* (1866), Band II, page 437, is quoted by Gildemeister and Hoffmann [*Die aeth. Oele* 3te Aufl. Bd. I (1928), page 91]: ".... anderseits das Terpentinoel und die zahlreichen mit ihm isomeren Kohlenwasserstoffe, welche im allgemeinen als Terpene bezeichnet werden moegen." However, if priority is dependent on publication, the credit for having used the work first should, possibly, be attributed to Beilstein, for in an article published in 1864 in the *Annalen* [Vol. 133, page 35], he makes the following statement: "Die andere Beimengung unseres Xylols besteht offenbar aus einer aeusserst geringen Menge eines Terpens." A terpene boiling between 270° and 300° (*sic*) is referred to. Again in 1865 he uses the word: "Sehr bald gelang es, zwei ganz constant bei 166 bis 170° siedende Kohlenwasserstoffe zu isoliren, von denen der erste Cumol, der zweite ein Terpin $C_{10}H_{16}$..." [*Ann.*, 137, page 320]. Again: "Der ganz constant bei 171° siedende Antheil des Steinkohlentheers ist ein Terpen von der Formel $C_{10}H_{16}$.... Das Terpen des Steinkohlentheers absorbirt...." [*Ibid.*, page 133.] It is apparent that the first reference is not to a terpene, $C_{10}H_{16}$, but possibly to a sesquiterpene as now understood. In the second reference the spelling "Terpin" occurs with that of "Terpen." This may be a printer's error. Comp. also Gildemeister's comment in footnote No. 3.

[3] Terebene was regarded by Berthelot [*Compt. rend.*, 55 (1862), pages 496 and 544; also *Ann.*, Suppl. II (1862–1863), page 226], as a chemical unit, but now is regarded as a mixture. The generic sense is brought out in sesquiterebene, $C_{15}H_{24}$, diterebene, $C_{20}H_{32}$, and polyterebene. For further details see Gildemeister, *Die aeth. Oele*, 3te Aufl. Bd. III, pages 89 and 90.

As early as 1840, Soubeiran [*Ann.*, 34, page 311] had employed the word camphene in a generic sense to designate all hydrocarbons C_5H_8. In 1862 Berthelot (*l. c.*) used the word to designate "camphene proper" the hydrocarbon derived from artificial camphor, $C_{10}H_{16}.HCl$. Our *l*-camphene he designated terecamphene, our *d*-camphene austracamphene. See also Gild., *l. c.*; also footnote No. 7.

[4] Thus Gerhardt in 1846, following the general system of classification according to the number of carbon atoms classifies the hydrocarbons $(C_5H_8)_x$ into camphenes, $C_{10}H_{16}$; para camphenes, $C_{15}H_{24}$; and meta camphenes, $C_{20}H_{32}$. [*Grundriss d. org. Chemie*, 2, pages 242 and 413; see also *Arch. d. Pharm.*, 4, page 144.]

Having, in 1860, proposed a detailed classification of the hydrocarbons $C_{10}H_{16}$ in his *Chimie organique fondée sur la synthese* (page 733), Berthelot, in 1869, showed how the hydrocarbons terebene, $C_{10}H_{16}$; sesquiterebene, $C_{15}H_{24}$; and diterebene, $C_{20}H_{32}$, isolated by him previously [*Ann. Suppl.*, 2 (1862–1863), page 228; from *Compt. rend.*, 55 (1862), pages 496 and 544] could be related to isoprene, C_5H_8, isolated by Greville Williams a few years before [Jahresb. 1860, page 495]. Regarding his terebenes as polymeres of isoprene, he names them accordingly:

Monomeres	C_5H_8		
Dimeres	$2C_5H_8$	=	$C_{10}H_{16}$ or terebene
Trimeres	$3C_5H_8$	=	$C_{15}H_{24}$ or sesquiterebene
Tetrameres	$4C_5H_8$	=	$C_{20}H_{32}$ or diterebene

Gladstone, in 1864 [*J. Chem. Soc.*, 17, page 1; also 25 (1872), page 1], arranged the volatile oil hydrocarbons into like groups but uses no group designations.

while used in a generic sense at times, had primarily a specific meaning. Much later it was used to designate certain, not all, hydrocarbons $C_{10}H_{18}$ with one double bond, referable to terpane or menthane (Methyl *p*-sec. propyl cyclohexane). With the subclassification of "terpenes" into hemiterpenes, terpenes proper, sesquiterpenes, etc., it is used to designate all hydrocarbons $(C_5H_8)_x$. Finally, it has been used, *e. g.*, in such designations as terpene literature, to include not only all hydrocarbons $(C_5H_8)_x$, but their derivatives as well. At the present time the concept has, therefore, a fourfold significance.

I. Terpenes: All Isomeric Hydrocarbons $C_{10}H_{16}$.[1]—As already pointed out, the older usage of the word comprising all hydrocarbons $C_{10}H_{16}$ is commonly attributed to Kekulé and dates back to the middle of the sixties of the past century. The numerical relationship of these natural hydrocarbons $C_{10}H_{16}$ to hydrocarbons C_5H_8 on the one hand, also to $C_{15}H_{24}$ and $C_{20}H_{32}$ on the other hand, was recognized at an early date and made use of in nomenclature.[1] Just as the older designations terebene, etc., have given way to terpene, so such words as sesquiterebene, etc., have given way to sesquiterpene since Wallach in 1885 adapted Kekulé's term to the older nomenclature. He recognizes three groups, *viz.*, hemiterpene, terpene and polyterpene.[2] The classification of Baker in his "Natural Terpenes" is essentially the same.[3]

All of the names suggested emphasize the group $(C_5H_8)_x$ and remove its representatives from their relationship to innumerable members of the organic type hydrocarbon, irrespective of whether they be natural or artificial, isomers or homologues. This unfortunate segregation has been emphasized by referring to such a hydrocarbon as C_9H_{14} (Santene-Norcamphene) as a homologue. Homologue of what? But even if it be regarded as a homologue in the crude empirical sense of

[1] Dodge would restrict the usage of the term "to those hydrocarbons $C_{10}H_{16}$, which occur in volatile oils." (See footnote No. 2.) This is in harmony with certain textbook definitions, but not in accordance with its earliest usage. Thus Beilstein (see footnote No. 5) designates as a terpene a hydrocarbon $C_{10}H_{16}$ isolated from coal tar. Dodge goes even a step farther and places additional restrictions upon its usage by demanding a certain configuration. In this he appears to be alone. (Comp. also Pseudoterpenes, and Aliphatic Terpenes.)

[2] The details of Wallach's early classification are herewith given:

A. Hemiterpene or Pentene C_5H_8 (isoprene).

B. Terpene $C_{10}H_{16}$.

1. Pinene group. Boiling point around 160°, unites with one molecule of HCl and the nitrosoderivative melts at 129°.
2. Camphene group. Solid terpenes melting about 50° and boiling under 160°.
3. Limonene group. Have citron-like odor and boil at 175° to 177°, the nitroso derivative melts at 104–105°, and they yield a dihydrochloride melting at 50°.
4. Dipentene group. Boiling at 180° to 182°, odor like limonene; tetrabromide melts at 125° to 126°; the dihydrochloride melts at 49° to 50°; etc.

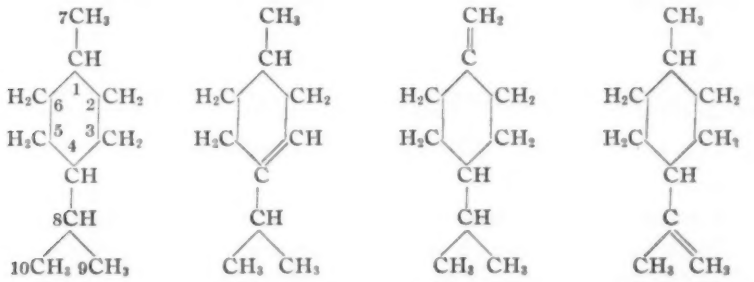
C. Polyterpene $(C_5H_8)_x$.

1. Sesquiterpene or tripentene. Boiling 250° to 260°; formula $C_{15}H_{24}$ as cedrene and cubebene.
2. Diterpene or tetrapentene. Boiling over 300°; formula $C_{20}H_{32}$. Example is colophene.
3. Polyterpene $(C_{10}H_{16})_x$ as caoutchouc (polymerized isoprene).

[3] A very recent classification is that of Baker [*Natural Terpenes* (1920), page 7] who bases his particular classification on structural relationship.

difference of CH_2, it will be seen that the recognition of homologues destroys the relationship based on isomerism of $(C_5H_8)_x$. The simplest way in which this difficulty can be obviated, is to classify these hydrocarbons as all hydrocarbons should be classified, *viz.*, in a rational system based on structural relations.

II. Terpenes: Hydrocarbons $C_{10}H_{18}$ with One Double Bond Derived from Terpane.—In accordance with the principles adopted by the Geneva Congress in 1893, the designation terpene has been applied to hydrocarbons $C_{10}H_{18}$ with one double bond derived by the removal of two hydrogen atoms from neighboring carbon atoms of the hydrocarbon terpane, $C_{10}H_{20}$, methyl-*p*-sec. propylcyclohexane.[1] The symbol used to designate "double bond" by v. Baeyer in his menthene synonyms is the capital Greek delta.[2] The position of the double bond is indicated by numbers, thus



The numbers indicating carbon atoms of the side chain are placed in parentheses.

Comp. Menthene.

III. Terpenes $(C_5H_8)_x$.—The original application of the term to hydrocarbons $C_{10}H_{16}$ was extended to all hydrocarbons $(C_5H_8)_x$ after the numerical relation of the terpenes proper to the larger group had been recognized. In his

[1] The minutes of the Geneva Congress were published by Tiemann, the secretary in the *Berichte*, Vol. 26, page 1595. A summary may be found in Meyer und Jacobsen, *Handbuch der Organischen Chemie*, Bd. I, page 1091, also in the corresponding volume of subsequent editions [*e. g.*, Vol. 1, page 147 of the second edition]. The 1893 Congress adjourned without having come to any decision concerning the nomenclature of cyclic compounds, expecting to take up the problem at a later session. Such a session was never held. Several attempts, however, were made by individuals to supplement the rules, adopted by the Geneva Congress with reference to chain compounds, by suggesting rules for cyclic compounds. Such an attempt for mono- and dicyclic compounds referred to in the literature of volatile oils was made by Semmler in his four volume work on "Die aetherischen Oele," 1906. [Vol. II, page 32.] The attempt, however, did not meet with favor on the part of workers in this field. Less ambitious, but more successful was the suggestion made by Adolf von Baeyer, a member of the Geneva Congress when later he proposed the term menthane for the hydrocarbon $C_{10}H_{20}$ underlying menthol and the term menthene as a group name for derivable hydrocarbons $C_{10}H_{18}$ with one double bond. (Ref.) Wagner proposed the designation terpane for the same saturated cyclic hydrocarbon $C_{10}H_{20}$ because it is the hydrocarbon underlying terpin, the diatomic alcohol or glycol, now better known as terpane diol- 1,8. The derivable hydrocarbons $C_{10}H_{18}$ with one double bond thus became terpenes, former dihydroterpenes.

[2] Confusion may arise when in place of the capital Greek delta the symbol Δ is employed since this is used to designate a cycle in contrast to double bond |=.

classical series in the Annalen on "Terpene und Campher"[1] Wallach uses the term in this, its broadest sense. In this sense it has also been used recently in an advertisement "Curcumen, Terpen $C_{15}H_{24}$, das neue Cholagogum."[2]

IV. Terpenes $(C_5H_8)_x$ *and Their Derivatives.*—Not only have Wallach's students been dubbed "Terpenkuenstler" even though the material upon which they worked were not hydrocarbons, but related oxygenated compounds, Fr. Heusler in 1895[3] contributed the article "Terpene" to the *Handwoerterbuch der Chemie* in which more space is devoted to related oxygenated compounds than to the hydrocarbons. As late as 1829 Ossian Aschan dedicated his treatise on Naphtenverbindungen, Terpene und Campherarten to Otto Wallach, "dem Altmeister der Terpenchemie." Hence, although in the title he differentiates between terpenes and camphors, he refers to Wallach's special field as terpene chemistry. These two illustrations of rather loose usage might be multiplied.

EXTERNAL EMULSIONS WITH A NEW EMULSIFIER.*

BY L. G. FREEMAN[1] AND E. L. SCHWABE.

The frequency with which prescriptions occur calling for oil, limewater and one or more impalpable powders such as zinc oxide, calamine, etc., presents a problem of finding a method which will give sufficient saponification to completely emulsify all of the oil and suspend these impalpable powders.

A number of series of emulsions were prepared without the incorporation of the impalpable powders, varying in oil content from 15–85%, some two hundred emulsions in all.

Olive oil, being most frequently prescribed, was used with the idea of developing a standard method of procedure, which, with modifications, could be applied to other oils. Twelve series of emulsions were prepared by the bottle method, English and Continental mortar methods, and the electric mixer, with and without added emulsifiers. Observations of separations occurring were made at varying intervals from twenty-four hours to six months. The following key being used to identify the oil–water ratios:

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[1] The same words are used in his book title "Terpene und Campher. Zusammenfassung eigener Untersuchungen auf dem Gebiete der alicyclischen Kohlenstoffverbindungen von Otto Wallach." Leipzig, 1909.

[2] Cover page of *Pharm. Zentralh.* for Dec. 19, 1926.

[3] This article was published in book form in the following year. In the preface thereto the following passage occurs: "Dem Umstande Rechnung tragend, dass die *Chemie der Terpene* (Italics the writers) zur Zeit im Vordergrund des wissenschaftlichen Interesses steht...." The table of contents refers to the following chapters:

Hemiterpene
Eigentliche Terpene
Kohlenwasserstoffe $C_{10}H_{18}$
Kohlenwasserstoffe $C_{10}H_{20}$
Anhang: Glieder der Terpengruppe mit offener Kohlenstoffkette
Sesquiterpene und Polyterpene.

* Section on Practical Pharmacy and Dispensing, A. PH. A., Toronto meeting, 1932.

[1] Asst. Prof. of Pharmacy, University of Buffalo.

	Per Cent.										
Oil	85	75	65	60	55	50	45	40	35	25	15
	A	B	C	D	E	F	G	H	I	J	K
Water	15	25	35	40	45	50	55	60	65	75	85

The results of these series show that where no added emulsifier is used the F or 50–50 ratio produces the greatest amount of emulsification. Tragacanth yields a better emulsion when water is in excess, poorer when the oil is in excess. Increasing the amount of tragacanth does not increase the amount of emulsification. The electric mixer gives a greater amount of emulsion, due to a finer subdivision of the particles, than do the other methods. With the English mortar method acacia yields a greater amount of emulsion than tragacanth.

Using the preceding series as a basis for further investigation, a number of series were now prepared using the same oil–water ratios as before and introducing Triethanolamine (from here on referred to as "*T*") as an added emulsifier to the limewater or distilled water, both with and without the addition of oleic acid.

SERIES NO. 20: OLIVE OIL, LIMEWATER, 2 CC. "*T*," BOTTLE METHOD.

The "*T*" was dissolved in the limewater and the oil added all at once, then vigorously shaken for one minute.

Results: Corresponded to series No. 1, namely, limewater and olive oil, by bottle method.

SERIES NO. 21: OLIVE OIL, DISTILLED WATER, 2 CC. "*T*," BOTTLE METHOD.

Results: Here we have a decidedly different preparation. The F showing twice the amount of separation as that of F-20. The clear separated layer was aqueous. The A of this series gives complete emulsification with no indication of separation on standing six months; whereas the A's of all other series separate fifty per cent in twenty-four hours and seventy-five per cent at the end of six months.

Subseries of A-20 and A-21 were made using decreasing amounts of "*T*" to determine how much was necessary to produce a homogeneous and stable emulsion. The "*T*" was decreased thus: A—2 cc., A1—1 cc., A2—0.5 cc., A3—0.35 cc., A4—0.25 cc., A5—0.20 cc., A6—0.15 cc.

Results: In the A-21 subseries, A, A1, A2 and A3, gave complete emulsification and no separation at the end of six months; A4 separated almost immediately and after six months showed three layers with an emulsified layer of about five per cent of the total volume; A5 and A6 showed no emulsification at all. In the A-20 subseries, A1 separated about 55% at the end of three days, and A2 about 70%. In both cases, 20-A1 and 20-A2 developed into three layer separations at the end of six months. The remaining emulsified layer of A2 was only one-sixth that of A1. The separation into layers of 20-A5 at the end of three days was about the same as at the end of six months; but for 20-A4 and 20-A3, containing larger amounts of "*T*," the separation at the end of three days was proportionately less, while at the end of six months this emulsified layer had contracted into a layer that in each case was proportionately less than that of the weaker "*T*" sample 20-A5.

The results from series No. 1 (limewater, olive oil, bottle method), and the results from series No. 20 (limewater, olive oil, "*T*," bottle method) indicate that they

form two different types of emulsions; one, an oil-in-water, the other a water-in-oil type. The results from the two subseries show that when these two types of emulsions are present in the same preparation, a greater amount of separation occurs than when the emulsion is only of one type. However, it would be necessary to make a more thorough study using 0.1-cc. to 5.0-cc. portions of "*T*" with the various A-K oil–water ratios, to determine which, if any, limewater-"*T*" combination would give us complete emulsification with no separation in a six months' period.

The above limitations suggested the introduction of oleic acid into the formula, which resulted in the following investigations:

SERIES NO. 22: OLIVE OIL, LIMEWATER, OLEIC ACID 5%, "*T*" 2%, BOTTLE METHOD.

(The above percentage figures represent the number of cc. substitution of olive oil by oleic acid and of limewater by "*T*" on a 100-cc. basis.)

Olive oil plus oleic acid is added to limewater plus "*T*" and vigorously shaken for one minute.

Results: Comparable to series No. 21 except that the emulsions were whiter and there was creaming. That is upon separation, instead of the aqueous layer being transparent, as it was in the previous series, it had a light cream color and an opacity like skimmed milk. From C to A the emulsified layer was more cream colored than from D to K. A of this series was perceptibly darker than sample A of series No. 21; and again complete emulsification resulted with no separation in six months.

SERIES NO. 23: OLIVE OIL, DISTILLED WATER, OLEIC ACID 5%, "*T*" 2%, BOTTLE METHOD.

Results: Similar to the previous series No. 22 except that the separated aqueous layer was tan and only slightly turbid. Sample No. 23-A showing a very small amount of separation at the end of six months; whereas the A's of the previous series showed no separation whatever. The oleic acid emulsions were less viscid than those in which it was not used.

A subseries of 23-F was made using varying amounts of oleic acid and adding the water plus "*T*" to the oil plus oleic acid, the other factors remaining the same. Series as follows: F1—2 cc., F2—4 cc., F3—6 cc., F4—8 cc., F5—10 cc., F6—15 cc.

Results: F1 to F4 had the same amount of emulsification which corresponded to 22-F and 23-F; F5 showed slightly more emulsification; F6 showed one-third more emulsification. The separated aqueous layers were pale tan and milky, with the emulsion cream colored. In F1 to F4 these layers were white. This shows that it takes more than 5% of oleic acid to increase the amount of emulsification with 2% "*T*." This series shows that oleic acid is not necessary for complete emulsification of the larger amounts of oil; but does promote the formation of more minute particles which consequently increases the homogeneity and stability of the emulsion.

To find out what effect varying methods of agitation have on "*T*" emulsions, F's of the various series were made with an electric mixer and in the mortar.

Results: Those made with the mixer did not yield a greater volume of emulsified layer and separated just as rapidly as those made by the bottle method. The ones made in the mortar did not yield as great a volume of emulsified layer as either of the others and separated more rapidly.

The possibility of using "*T*" as an emulsifier for other oils was tried using the 50–50 ratio, with the following results: oil of almonds (expressed) gave complete emulsification with 0.35 cc. or more of "*T*." Cotton seed oil gave no emulsification with varying quantities of "*T*" up to 1 cc. Cod liver oil gave complete emulsification with 0.35 cc. or more of "*T*." Castor oil gave complete emulsification with 0.35 cc. or more of "*T*." Liquid petrolatum gave complete emulsification with 0.35 cc. of "*T*" when 5% oleic acid was added.

SUMMARY.

Many oils containing free fatty acids yield stable emulsions with "*T*." As the per cent of oil increases, the amount of emulsification brought about by using "*T*" is increased, 85% oil and 15% water yielding a product which does not separate on six months' standing. When the free fatty acid content of the oil is sufficiently high, stable emulsions can be made with aqueous solutions of "*T*." Oleic acid may be added to an oil when it contains no free fatty acid or an insufficient amount to completely emulsify the oil and produce a stable emulsion with "*T*."

Quick, thorough agitation is necessary in the preparation of these emulsions. If the agitation be too vigorous and too prolonged, as found when the electric mixer is used for longer than one minute, the emulsion tends to break.

The kind of agitation produces some variation in the amount of emulsification. The bottle method yields as stable and homogeneous an emulsion as any of the other methods; and in addition requires less time and incurs no loss of the final product.

Triethanolamine is indicated as an emulsifier for pharmaceutical preparations where an emulsifier is necessary; either as the emulsifying agent or as an added emulsifier.

THE PREVENTION OF RANCIDITY BY MALEIC ACID.

Maleic acid has been found serviceable for preventing rancidity in edible fats and oils. Dr. G. R. Greenbank, of the U. S. Department of Agriculture, who made the discovery, has applied for a public service patent on its use for this and similar purposes; under such a patent, the product can be used freely by anybody, and no one can establish a monopoly.

Dr. Greenbank was led to his discovery in research to find out why some oils and fats kept naturally better than others. He did not succeed in learning this, but did learn that the natural "better keepers" had extremely minute quantities of unidentified organic acids in them. Then he tried adding acids of known composition to oils and fats, and soon found that maleic acid, added in a proportion of one part to ten thousand of the oils to be preserved, would greatly extend the limits of rancidity, the better the quality of the oil the longer it would be preserved by the maleic acid. Further study is being given to the chemistry of maleic acid's efficiency in preventing rancidity.

COBWEBS FOR QUININE IN 1883.

"Cobwebs are the coming remedy as a substitute for quinine, according to Spanish medical authorities. Dr. Oliva, in the *Correspondent Medical*, summarizes 119 cases of treatment by this remedy (telerana is the Spanish name for cobweb), and concludes that it will cure intermittent malarial fever, whether quotidian or tertiary. The dose is 30 grains for adults, 15 for children." *Chemist and Druggist*, Feb. 15, 1883.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

C. B. JORDAN—CHAIRMAN OF EXECUTIVE COMMITTEE, A. A. C. P., EDITOR OF THIS DEPARTMENT.

"The teaching of experimental pharmacology in the college of pharmacy is difficult because it requires considerable equipment and because the laboratory material requires care to handle and expense in providing it. If the college of pharmacy is connected with a larger educational institution giving a course in experimental pharmacology, the college is indeed fortunate. The University of Maryland School of Pharmacy has splendid equipment for the teaching of this subject, and the following paper on 'The Importance of Experimental Pharmacology and Its Possibilities in the Pharmaceutical Curriculum' by Professor Marvin R. Thompson will be an inspiration for those colleges that have difficulty in developing such a course."—C. B. JORDAN, *Editor*.

THE IMPORTANCE OF EXPERIMENTAL PHARMACOLOGY AND ITS POSSIBILITIES IN THE PHARMACEUTICAL CURRICULUM.*

BY MARVIN R. THOMPSON.[1]

Although a course in Experimental Pharmacology forms a part of the curriculum in only a very few Schools of Pharmacy, the possibilities of such a course have been recognized sufficiently to at least become a matter great enough in importance to merit discussion among the educators of the profession. It is probably true, however, that the proponents of such a course at present are greatly outnumbered by the opponents. Having had some experience in both the practice and teaching of Experimental Pharmacology, it is my purpose to briefly set forth certain views which will arouse interest and further discussion as to whether or not such a course properly deserves a place in the pharmaceutical curriculum.

All pharmaceutical educators are bound and invariably willing to adopt such measures as are necessary in equipping their students as professional pharmacists of the highest possible type. We recognize as a professional pharmacist one who is thoroughly capable and conscientious in providing the medical profession with standardized therapeutic agents of current recognition. It logically follows, therefore, that to increase the standing and recognition of pharmacy as a profession, the efforts of our schools must be bent in such a direction as to graduate only those who have demonstrated such qualifications in full.

Are pharmaceutical graduates of the present time fully qualified to assume wholly such responsibilities and duties of their profession?

It is an irrefutable fact that there is a considerable number of therapeutic agents which requires biological assay and standardization, and that the number is ever increasing. Training in Experimental Pharmacology is the only way by which a student can qualify himself for this work. By our accepted definition of a Pharmacist, this responsibility is his, and his alone. Therefore, it cannot be said that pharmaceutical educators have accepted responsibilities which are traditionally theirs, until courses in Experimental Pharmacology and attendant facilities are made available in our Schools of Pharmacy.

* Delivered before the Teachers' Conference on Materia Medica, Toronto meeting, 1932.

[1] Emerson Professor of Pharmacology, School of Pharmacy, University of Maryland.

It has been argued that retail pharmacists would have no use for such training, because of the impossibility of carrying on such work, in a drug store. It is at once admitted that such work cannot be pursued successfully in the practice of retail pharmacy. But is it not true that pharmaceutical manufacture, chemical synthesis and analysis, etc., are at present practiced to practically no extent at all in the drug store? Yet we do not accept this as an argument against courses pertaining to these phases in our curriculum. And, indeed, rightly so. Experimental Pharmacology should be considered in a similar light.

It may be observed that every recognized profession is made up essentially of three types of workers; those who engage in actual practice, those who teach and those who pursue research. It may at the same time be observed that the amount of recognition any profession enjoys is in a measure proportional to the qualifications of the teachers, but even more directly to the advance through research achievements of the profession. Increased efforts in the field of research, therefore, forms a logical way to increase the recognition of our profession.

Would the teaching of Experimental Pharmacology actually serve such a desirable purpose? For an answer to this question, one has but to look to the accomplishments of our pharmaceutical chemists, who long have been, and are now, constantly preparing new compounds and isolating new chemical principles. But is Pharmacy capitalizing to fullest extent on these achievements? Obviously not, simply because of the fact that new substances must be investigated pharmacologically, which Pharmacy is at present unable to accomplish, and they are either investigated by those of other professions, or they are never studied at all.

In a recent issue of "Science News Letter," August 6, 1932, the following paragraph appeared:

> "The pharmacist has much less call for his skill and knowledge nowadays, a survey shows, for physicians increasingly prescribe medicines in terms of trade names instead of ingredients to be compounded."

If this is true, and it is undeniably so, it becomes necessary for pharmacy to supply properly qualified workers to assume their just responsibilities in the pharmaceutical manufacturing houses, both from the standpoint of manufacturing, and also the chemical and biological standardization of products, thereby making it absolutely essential that Schools of Pharmacy make training in Experimental Pharmacology available to students desiring to pursue biological testing and assaying, a field whose importance is already recognized, and which is a function of pharmacy just as surely as is chemical assaying and testing of therapeutic agents.

Opponents of such a course in pharmacy may argue that students desiring to study biological assaying and testing may obtain such training in a Medical School. A knowledge of the facts brings forth my flat contradiction to such a view. In explanation, it must be pointed out that, as in chemistry, Experimental Pharmacology is sharply divided into two branches, *i. e.*, qualitative and quantitative. Medical Schools are concerned almost exclusively with the qualitative branch, or with the *nature* or *kind* of *all* drug actions. Pharmacy should be concerned primarily with the quantitative branch which includes biological assaying and particularly with respect to just those drugs which, by their nature, require this type of control. The difference between the two branches requires different

qualifications in instructors, and different equipment and facilities. It is, therefore, impossible for a student to receive a course which would adequately qualify him as a bio-assayist in the average School of Medicine.

Those who have not accepted biological assays frequently raise the question: "Do biological assays reflect the true therapeutic action of the drug?" then, illustrating their point by taking, as an example, digitalis, whose potency is determined by its ability to stop the heart of the frog, whereas in therapeutics it is used as a heart stimulant. Such arguments merely result from a lack of knowledge of facts. It would be just as logical to question the accuracy of the chemical estimation of alkaloids because they are not used therapeutically to neutralize acids in the body. Once the active principle of the drug has been determined, or the desirable type of activity has been ascertained, the method of quantitative estimation of that principle or type of activity, need have no relationship to the therapeutic use, whether it be a biological or chemical method.

I believe that providing training in experimental pharmacology, with particular respect to its branch of quantitative pharmaco-dynamics, in Schools of Pharmacy, will serve to better the standing of the profession, *first*, because, in biological assaying, we will assume a responsibility which is justly ours, and *second*, because we will increase our facilities toward achievement in research.

For obvious reasons, there would be no necessity for making such training a requirement in our curriculum, but it is believed that the provision of such training as elective, would yield results distinctly to the advantage of professional pharmacy.

As a closing thought, I would bring forth an important matter, intimately bearing upon the above, for the consideration and support of workers in pharmacy. Biological assay and standardization requires the preparation and distribution of proper standards. This, as bioassaying itself, should be strictly a function of pharmacy, and would properly be carried out by experienced and qualified pharmacists located in the new American Institute of Pharmacy, at Washington.

SOME FACTS AS BROUGHT OUT BY THE STUDY OF THE ACTUAL PRICES CHARGED FOR PRESCRIPTIONS.*

BY LEON MONELL.[1]

"The following paper by Professor Leon Monell again emphasizes the importance of some concerted effort to bring about a uniform method of pricing prescriptions. Teachers of pharmacy should continue to agitate this question until they arrive at a method that is applicable to all parts of the United States, or nearly so, and then proceed to teach this method in the colleges. A bad condition will not be righted until it has been well exposed, and the following paper by Professor Monell materially assists in exposing the unsatisfactory prescription-pricing conditions that now exist."—C. B. JORDAN, *Editor*.

Your secretary, Dr. R. W. Rising, has requested me to present the data resulting from my study of the actual prices charged for prescriptions.

Continuing last year's study of the actual prices charged for new prescriptions,

*Read before Conference of Teachers of Pharmacy, American Association of Colleges of Pharmacy, Toronto, August 22, 1932.

[1] Associate Professor of Commercial Pharmacy, University of Buffalo.

prices have been secured from 377,315 new prescriptions, exclusive of refills and liquor, from thirteen sections of the United States and from a miscellaneous group not sufficient in number to classify as separate units. The store filling the smallest number of new prescriptions reported only 56 for the year 1931. During two months it filled none, one month only one, and another month only two prescriptions. The maximum was eleven new prescriptions during the month of June. In contrast to this store, the one reporting the largest number of new prescriptions during the year reported filling 40,093 new and 34,197 refills.

This study has been possible through the kind assistance of a number of teachers in schools of pharmacy, to be acknowledged at the end of the paper, and *Merck's Report* which editorially solicited prices. Without the assistance of both sources it would have been impossible to secure the data presented herein.

Prices are listed according to the center from which secured and do not necessarily mean that the prices are all from that city but, instead, include neighboring towns. For example: Philadelphia includes stores in the city of Philadelphia, small towns in Pennsylvania, and a few towns in the lower part of New Jersey near Philadelphia.

The method used in compiling was to secure the actual prices of an equal number of prescriptions compounded each month of 1931. In this way, seasonal variation is eliminated. This is the same method used last year. In stores that did not fill 1000 new prescriptions, all that had been filled were included.

The average prices, as a result of this study, are shown in Chart I.

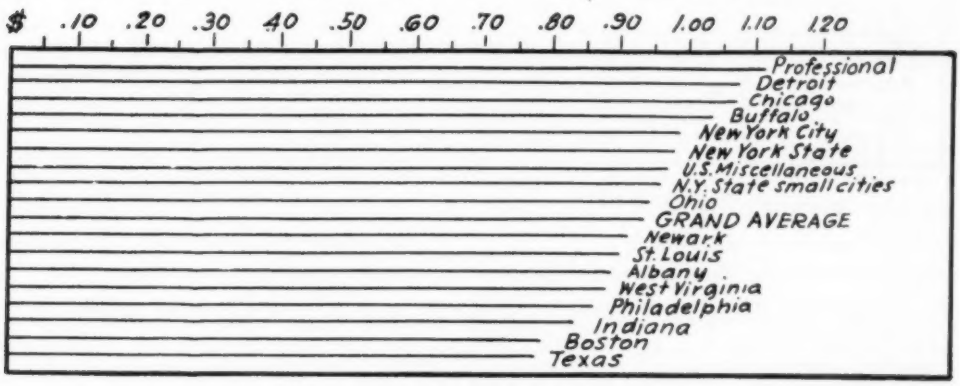


Chart I.—Average price of prescriptions.

The average price this year of $0.943 is slightly lower than the last year figure of $0.971. However, it is slightly higher than the figure found in the St. Louis Drug Store Survey of $0.92. No doubt part of this reduction is due to slightly lower prices being charged this year for prescriptions.

Professional stores, when segregated, showed the highest average price. Next came Detroit followed closely by Chicago with Boston and Texas having the lowest prices.

Albany had the lowest average of any section of New York State. This is due, no doubt, to the fact that it includes practically nothing but small towns. It is much lower than the New York State small cities and towns, exclusive of those secured by the Albany College.

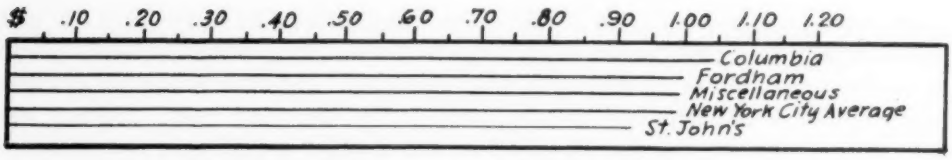


Chart II.—Average prices as secured in New York City.

Chart II shows the variation in prices secured in New York City.

The Committee on Pharmaceutical Economics of the New York Pharmaceutical Association sent a questionnaire to every drug store in New York State. One of the questions asked was: "Will you fill in the actual prices charged for 1000 new prescriptions for the year 1931 if a blank is sent to you?" Over seventy-five stores filled in the blanks, and those from New York City thus secured are recorded under the heading, "New York City Miscellaneous." Please note the small difference in these results as compared with the average for the City.

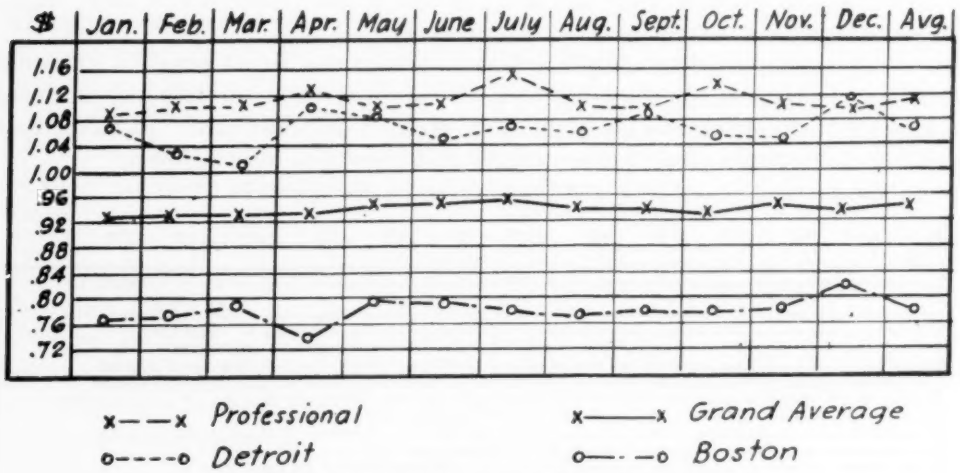


Chart III.—Average price of prescriptions by months.

Chart III shows the average price by months of professional stores, Detroit, grand average, and Boston. The grand average was fairly constant for the entire year, varying only by about $0.02 during any months, the highest variation being in July and the lowest in January.

In addition to the above-mentioned data, the range of prices of 126,788 prescriptions was studied with the following results:

Range.	126,788 Prescriptions.	Detroit.	Chicago.	Boston.
$0.00–$0.50	15.38%	7.38%	7.38%	26.71%
$0.51–$0.75	27.20	23.54	23.59	36.52
$0.76–$1.00	30.04	36.92	36.80	23.32
$1.01–$1.25	12.35	15.50	15.09	6.80
$1.26–$1.50	7.53	8.50	9.49	3.72
$1.51–$2.00	4.28	5.22	4.58	2.13
$2.01–$3.00	1.91	1.79	1.88	0.55
$3.01–$5.00	0.74	0.89	1.01	0.16
Over $5.00	0.15	0.25	0.15	0.05

Unfortunately, these price ranges are not quite the same as those which developed from the St. Louis Drug Store Survey and therefore a direct comparison cannot be made. However, the same conclusions as given on page sixteen of *Prescription Department Sales Analysis in Selected Drug Stores* of the St. Louis survey hold here, namely: "as the price increased or decreased from the $0.75 to $1.00 average, the number of prescriptions decreased."

Detroit, Chicago and Boston are recorded to show the almost identical percentages between Detroit and Chicago, as well as the extreme difference between either Detroit or Chicago and Boston. You will note that the stores with the highest average price have the least number in the low-price range.

When we consider the minimum and maximum prices charged for these prescriptions, the minimum price charged was $0.05 and the maximum was $40.00. The maximum occurred only once but the five-cent price occurred a number of times. Why should any one fill a prescription for only five cents? It does not seem worthy of the profession to do so. The reason for Boston and some other sections having a low average as compared with Detroit and Chicago is not due so much to their filling them cheaper as it is to filling more at the low rate.

The minimum range for Detroit stores was $0.25 to $0.40, for Chicago stores it was $0.10 to $0.50, while Boston stores had a slightly lower minimum of $0.10 to $0.35. There is a slightly greater difference in the maximum range of these stores. Detroit had a maximum range of $3.00 to $10.00, Chicago was from $3.75 to $8.50, while Boston had only $2.25 to $6.50 thus causing a lower average. The minimum for professional stores was $0.10 to $0.25 and the maximum was $6.00 to $13.50. Professional stores fill prescriptions as cheaply as other stores except less often.

May I repeat our question of last year? Is it just that even the simplest prescription should be compounded at a price no more than the price of a glass of soda water or a sundae? I may add this year "or a beverage," because we have five-cent-prescriptions this year. More money is made on a soda beverage than all the five-cent prescriptions you can fill.

The results of this study show that some cities and sections have a much lower average than others. Why should Detroit and Chicago have averages over one dollar while Boston and Texas have averages less than eighty cents? Can this be accounted for economically? Is the expense of filling prescriptions less in some cities than in others? In some instances there is a difference. I know that at one time a pharmacist's salary in Boston was slightly less than in Buffalo. On the other hand, is it sufficient to justify this difference? Personally, I do not think so.

While discussing the difference in price in Columbus, Ohio, and in Buffalo on last year's figures with one of my colleagues, Professor Louis Freeman, he told me that he had found the same thing to be true. From data which he was collecting on the pricing of identical prescriptions, there was as much as 300% difference on any one, and certain sections were lower than other sections.

Other than the economical side there is another phase to cheap prescriptions. The other day while discussing this study with a pharmacist he made the old statement that "the fault with the prescription business is that physicians are dispensing their own medicines" and referred to a prominent doctor who has this

reputation. I had an interview with this doctor, and during our discussion he told me that he was dispensing less medicine to-day than formerly. When I asked him his reason, he replied: "I am not being paid for my calls now, so why should I also give medicine for nothing? Now I let them get it at the drug store." When I asked him if he would continue to do so, he replied that he would as long as conditions are as they are. I then asked him why he began to dispense his own medicine and be blamed the pharmacist for it. His reason is this:

Some time before the World War he gave a patient a prescription for an eight-ounce bottle of bromides. The pharmacist charged the patient thirty-five cents for it. The patient remarked to the pharmacist, "This can't be much good when it only costs thirty-five cents." The pharmcist replied that it only contained bromides, with the result that the patient went back to the doctor and told him his medicine was no good, repeated what the pharmacist had said, and concluded he would get another doctor. This second phase of cheap prescriptions is psychological. People who receive cheap medicine lose faith in it. In this case, the pharmacist lost sight of his professional training and did pharmacy a great injury.

According to *Causes of Failure among Drug Stores*, in the St. Louis Survey, "poor business management" was one of the leading causes of failure. Of the thirty who failed, twenty-one never took a profit and loss statement and nine reported they did not know how to determine inventory turnover, etc.

Cannot this statement be made: the causes of prescription failure may be due to poor prescription management? Do we know enough about the prescription department to properly conduct it? Is there a justification for a difference of twenty-nine cents in the prices charged for prescriptions between Detroit and Boston? This study shows that the stores with the high averages fill comparatively few in the low price range.

Many pharmacists say that they have no idea how to figure the price of prescriptions. Do we have enough statistical data on costs of prescription filling to be able to make statements? It would be very beneficial to the pharmacist if we had a good, simple formula for figuring prices. I know of several, but I believe the simplest one to date is the one recently published in the *Pacific Drug Review*. I will not discuss it as I understand some one is going to read a paper on it at one of the sessions of this convention.

As a result of this study, I have these conclusions to offer:

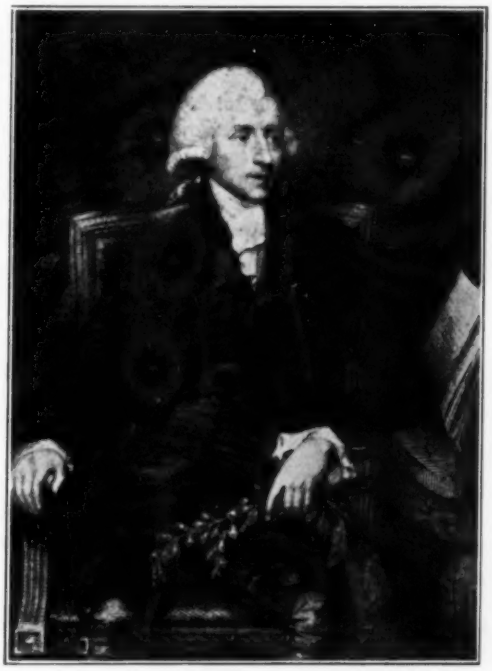
First. The prices of prescriptions in small towns and cities are lower than in the large cities.
Second. The professional store gets the highest prices.
Third. The range of price is a very important factor.
Fourth. There is room for considerable work on the economic side of prescription compounding. Schools of pharmacy would do well to consider this problem with their students.

In conclusion, I wish to thank the following who have assisted me in collecting the prices of prescriptions either themselves personally or through their students: Walter Scharbach, Albany College of Pharmacy; Dean Roland T. Lakey, College of Pharmacy of the City of Detroit; Dr. Curt P. Wimmer, Columbia University; Dr. Otto F. Canis, Fordham University; Professors E. N. Gathercoal and R. E. Terry, Illinois College of Pharmacy; Professor Leon Thompson, Massachusetts College of Pharmacy; Dr. R. W. Rising, New Jersey College of Pharmacy; Pro-

fessor C. M. Brown and the Phi Rho Alpha Fraternity of Ohio State University; Professors Harvey Frank and Adley Nichols of the Philadelphia College of Pharmacy; Dean C. B. Jordan and J. L. Weinland, Purdue University; Dean John L. Dandreau, St. Johns College of Pharmacy; Professor William R. Neville, University of Texas; Professor J. H. Hayman, University of West Virginia; Mr. Frank A. Delgado and his associates of the United States Department of Commerce; C. L. Robertson, Editor, *Merck's Report;* Sigma Alpha Phi Fraternity and the students of the University of Buffalo; and lastly Mrs. Leon Monell for her many hours of tabulating and checking reports.

WILLIAM WITHERING AND DIGITALIS.

Foxglove was always a medicine with a popular rather than a professional reputation until Dr. William Withering, of Birmingham, published "An Account of the Foxglove, and Some of Its Medical Uses," in 1785. He was a scientific pioneer—a painstaking botanist in whose honor a genus of the Solanaceæ was named Witheringia, and a mineralogist whose name is similarly commemorated by Witherite. In the account referred to, he narrated that ten years previously his opinion had been asked about a family recipe for the cure of dropsy which had long been the secret of an old woman in Shropshire, and which he was told had cured cases after regular treatment had failed. The medicine was composed of twenty different herbs, of which digitalis was an active ingredient.



WILLIAM WITHERING, M.D.

From an engraving by W. Bond from an original picture painted by C. F. Breda in the possession of William Withering, Esq. F.L.S.

Dr. Withering details his experience as well as that of others with foxglove in some hundreds of cases. He noted its action on the heart and as a diuretic. He had also ascertained that it was prescribed in family recipes in Yorkshire. An article in "Parkinson's Herbal"—(written, he believed, by Mr. Saunders, an apothecary of great reputation at Worcester) declared it to be of great value in consumptive cases. It had been admitted into the Edinburgh Pharmacopœia, 1783, but many practitioners were giving it in such dangerous doses that he feared its reputation would not last long.

Dr. Withering died in 1799, aged 58 years. A foxglove is carved on his monument in Edgbaston Old Church, and the plant is also shown in Breda's painting. Most of these data have been taken from "Wooton's Chronicles of Pharmacy."

The following State Legislatures have adjourned:

Arizona, Arkansas, Indiana, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, West Virginia, Wyoming.

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1932–1933.

Office of the Secretary, 10 West Chase Street, Baltimore, Md.

LETTER NO. 6.

February 10, 1933.

To the Members of the Council:

46. Contract for Printing and Mailing the Journal of the A. Ph. A. for 1933. Motion No. 9 (Council Letter No. 5, page 72) has been carried and the contract awarded to the Mack Printing Company.

47. Budget for 1933. Motion No. 10 (Council Letter No. 5, page 72) has been carried and the budget is approved as submitted.

48. Selection of Auditors. Motion No. 11 (Council Letter No. 5, page 74) has been carried and W. A. Johnson & Co. have been employed to audit the accounts for 1932.

49. Election of Members. Motions Nos. 12 and 13 (Council Letter No. 5, page 74) have been carried and applicants for membership numbered 60 to 65, inclusive, and applicant numbered H-3 are declared elected.

50. Life Members. The following members have become Life Members through the payment of dues for thirty-seven consecutive years and certificates have been sent them: Charles Leland Davis, Harry Matusow and Cornelius Osseward.

51. Northern New Jersey Branch of the A. Ph. A. The following application and proposed Preamble, Constitution and By-Laws have been received.

To the Council of the American Pharmaceutical Association:

We, the undersigned members of the AMERICAN PHARMACEUTICAL ASSOCIATION, wish to organize ourselves into a local branch, to be known as the Northern New Jersey Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, and do hereby make application to the Council for recognition as such a body. The constitution and by-laws are submitted herewith for approval:

Ernest Little, Geo. C. Schicks, Robert William Rodman, Louis Wait Rising, C. L. Cox, Emmet J. Doyle, Grace I. Harper, Bernard J. Chiego, O. P. M. Canis, J. M. Block, Adolph F. Marquier, S. B. Mecca, H. E. Wrensch, Phil E. Hommell, John Norman Silsby, Marie C. Jannitti.

PREAMBLE.

WHEREAS, The advancement of pharmaceutical knowledge and the elevation of the professional status of pharmacists are objects to which we most heartily subscribe; and,

WHEREAS, THE AMERICAN PHARMACEUTICAL ASSOCIATION has for more than eighty years actively and earnestly labored on behalf of these two purposes; and,

WHEREAS, We approve of the work of the ASSOCIATION in this direction and believe that the effectiveness and usefulness of its efforts can be increased and further extended by the formation of local branches; be it,

Resolved, That we do, hereby, agree to constitute ourselves such a branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, and pledge ourselves not only to maintain its laws and principles but also to assist in every way possible to further elevate the practice of pharmacy and aid in the advancement of pharmaceutical knowledge, and to such an end we adopt and accept the following Constitution and By-Laws.

CONSTITUTION.

Article I—Name. The name of this organization shall be the Northern New Jersey Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION; abbreviated N. N. J. Br. of A. PH. A.

Article II—Purposes. To further the objects and aims of THE AMERICAN PHARMACEUTICAL ASSOCIATION by providing the extension of its work in northern New Jersey, to secure for pharmacists of this section the advantages that may be secured by affiliation with an organization

of high ideals and common purposes, to provide the means for pharmacists of northern New Jersey to contribute their individual and collective efforts along lines of value to retail pharmacists generally, and to encourage natural, proper and helpful relations between medicine, dentistry and pharmacy, are some of the purposes for which this Branch is formed.

Article III—Members. The membership of this Branch shall consist of the following classifications:

Section 1. *Active:* Members of the AMERICAN PHARMACEUTICAL ASSOCIATION residing in the State of New Jersey within a radius of fifty miles of Newark, who are not members of any other Branch of the ASSOCIATION, may, on signifying their intention of adhering strictly to the Constitution of the parent body and subscribing to the principles announced in the Preamble and Constitution and By-Laws adopted by this Branch, be elected to active membership in this Branch.

Section 2. *Associate:* Members of the AMERICAN PHARMACEUTICAL ASSOCIATION residing in the area of the Branch, who are not active members, shall be considered associate members, and shall be entitled to all the privileges of active membership excepting the right to vote, serve on committees or hold office.

Section 3. *Honorary:* Any person who is not an active member of this Branch, and who shall assist the Branch by the contribution of scientific papers, work or research, or add to its financial resources, may be elected to honorary membership without the right to vote or hold office.

Article IV—Amendments. This Constitution can be altered or amended by the affirmative vote of a majority of the active members of this Branch, provided propositions to alter or amend have been submitted in writing at the preceding meeting.

BY-LAWS.

Article I—Officers. The officers of this Branch shall be *president, vice-president, secretary, treasurer* and *delegates to the House of Delegates.* The latter can, if desired, be one of the other officers.

Article II—Committees. The standing committees of this Branch shall be appointed by the president at the March meeting of each year or as soon thereafter as possible, and shall be as follows:

Section 1. *On Membership:* To consist of three members who will direct the maintenance and development of the membership of the Branch.

Section 2. *On Professional Relations:* To consist of three members who shall direct the work of improving relationships between pharmacists, physicians and dentists in this area.

Section 3. *On Science and Practice of Pharmacy:* To consist of three members who shall investigate and report at each meeting developments in the practice of the profession of interest to members.

Section 4. *On Education and Legislation:* To consist of three members who shall represent the branch in all matters pertaining to education and legislation in New Jersey affecting pharmacy in this state.

Section 5. *Executive:* To consist of the vice-president as chairman, the chairmen of all standing committees, and as ex-officio, the president, the secretary and the treasurer, who shall transact business of the Branch in an emergency or during the period between regular meetings.

Article III—Meetings. The meetings of this Branch shall be held on the second Monday night of each month from October to May, inclusive, at eight o'clock.

Article IV—Meeting Place. The regular meeting place of the North Jersey Branch shall be the Rutgers University, College of Pharmacy, 1 Lincoln Avenue, Newark, N. J., and this shall be the official address of the Branch.

Article V—Quorum. Seven members of the Branch shall constitute a quorum.

Article VI—Dues. Every active member of the Branch shall annually contribute the sum of one dollar in dues.

Article VII—Fiscal Year. The fiscal year of the Branch shall be from the stated meeting of March of one year to the similar meeting of the following year.

Article VIII—Elections. The officers shall be elected, by ballot, at the March meeting, and shall serve one year, or until their successors shall have been elected.

Article IX—Presiding Officer. In the absence of the president or vice-president at any stated meeting the members present shall elect a presiding officer pro tempore.

Article X—Secretary. The secretary shall keep fair and correct minutes of the proceedings of the meetings and send reports of the same to the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION and such journals and newspapers as he may deem proper. He shall carefully preserve, on file, all reports and papers of every description presented to the Branch, and shall be charged with the necessary business and scientific correspondence. He shall read all papers handed to him by the president for that purpose, shall call and record ayes and nays whenever they are required to be called; shall notify the chairman of every standing and special committee of his appointment, giving him a list of his colleagues and stating the business upon which the committee is to act. He shall notify every member at least one week in advance of the time and place of each meeting.

Article XI—Treasurer. The treasurer shall collect and take charge of the funds of the Branch and shall give receipts for same. He shall pay no money except on the order of the secretary, countersigned by the president, and accompanied by the proper vouchers. He shall present a statement of his acounts at each March meeting of the Branch. He shall be bonded by an amount to be stipulated by the Branch and shall receive the amount of his expenses incident to the duties of his office.

Article XII—Order of Business. The order of business shall be as follows: (1) *Reading of the minutes,* of the previous stated meeting; (2) *Introduction of newly elected members;* (3) *Reports of special and standing committees;* (4) *Unfinished or deferred business;* (5) *New business;* (6) *Specific business;* (7) *Nominations and elections;* (8) *Adjournment.*

Article XIII—Miscellaneous. Every proposition to alter or amend these by-laws shall be submitted in writing at a stated meeting of the Branch, and may be balloted for at any subsequent stated meeting, when, upon receiving the votes of three-fourths of the members present, it shall become a part of the by-laws.

Article XIV—Rules of Order. On all points not specifically mentioned in the by-laws governing this section, the By-Laws of the AMERICAN PHARMACEUTICAL ASSOCIATION shall take precedence over the other decisions on parliamentary rules.

(*Motion No. 14*) *It is moved by Kelly that the application for the formation of the Northern New Jersey Branch of the A. Ph. A. and the proposed Preamble, Constitution and By-Laws be approved.* A vote on this motion is called for at this time but will be considered as tentative if there is objection or if any member wishes to discuss it.

52. North Pacific Branch of the A. Ph. A. The following application and proposed Preamble and By-Laws have been received:

AMERICAN PHARMACEUTICAL ASSOCIATION,
10 West Chase Street, Baltimore, Maryland.

Attention—E. F. Kelly, Secretary.

Gentlemen:

We, the members of the AMERICAN PHARMACEUTICAL ASSOCIATION, wish to organize a local branch at Portland, Oregon, for the purpose of furthering the objects of the AMERICAN PHARMACEUTICAL ASSOCIATION in Oregon.

We hereby petition the Council for the recognition of a branch organization to be known as the North Pacific Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The by-laws are herewith submitted for approval.

Dated January 20, 1933.

F. C. Felter, 503 Woodlark Bldg.; Walter Rhodes, 2009 N. Killingworth Ave.; Harvey J. Donnell, 324 Alder St.; F. A. Geue, 448 Stark; J. Harry Weis, 639 Washington St., Portland, Oreg.; Frederick Grill, North Pacific College of Oregon; Frank Nau, 324 Alder St.; A. O. Mickelsen, 3904 N. E. Royal Court; John Witty, 1700 N. E. Union Ave.; Earl Gunther, 404 Taylor St.; R. MacFarlane, 1530 N. E. Tenth Ave.; L. G. Haack, 423 Taylor St.; M. C. Kaegi, 5107 N. E. Sandy Blvd.; Geo. W. Stellhammer, Silverton, Oreg.; Edwin A. Robinson, Portland, Oreg.; Holly Phipps, 809 Longview Ave., Portland, Oreg.; Charles W. Abbott, 1530 E. 10th

N., Portland, Oreg.; G. A. Carnes, 777 E. 10th S., Portland, Oreg.; A. E. Crosby, 1024 Klickitat, Portland, Oreg.

PREAMBLE AND BY-LAWS OF THE NORTH PACIFIC BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

In order to stimulate a better acquaintance of members for the exchange of ideas and for the betterment of Pharmacy in Oregon.

Therefore, we, the undersigned members of the AMERICAN PHARMACEUTICAL ASSOCIATION, do hereby resolve to constitute ourselves into a local branch, for the purpose of advancing the objects for which the body was founded.

The name of this body shall be The North Pacific Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The Branch hereby adopts for its guidance the Constitution and By-Laws of the AMERICAN PHARMACEUTICAL ASSOCIATION and its members hereby subscribe to them.

BY-LAWS.

1. Members.—This Branch shall consist of active and associate members.

2. Active Members.—All members of the AMERICAN PHARMACEUTICAL ASSOCIATION residing in Oregon may, on signifying their intention of adhering strictly to the provisions enumerated in the preamble and in the Constitution of the AMERICAN PHARMACEUTICAL ASSOCIATION, be elected to active membership of this Branch.

3. Associate Members.—Any person who is not an active member, but who manifests his interest either by contribution or active participation in work or research, scientific papers, or add to its financial resources shall be termed an associate member but without the right to vote.

4. Officers.—The officers of the Branch shall be a *president*, two *vice-presidents* and *secretary-treasurer*, and *delegates to the House of Delegates.*

5. Committees.—At the first meeting of each fiscal year or as soon thereafter as possible, the president shall appoint four standing committees, as follows: *A Committee on Practical Pharmacy*, to consist of three members; a *Committee on Professional Relations*, to consist of three members; a *Committee on Program*, to consist of three members; a *Committee on Membership*, to consist of five members.

6. Executive Committee.—The officers of the Branch and chairman of the Standing Committee shall constitute the *Executive Committee* to transact all the necessary business connected with the regular meetings of the Branch.

7. Meetings.—Regular meetings of the Branch shall be held 3rd Monday of January, May and October, and other meetings may be held on call of President or Executive Committee.

8. Quorum.—Seven members shall constitute a quorum.

9. Dues.—Every active and associate member shall contribute annually the sum of one dollar.

10. Fiscal Year.—The fiscal year of the Branch shall be the regular calendar year.

11. Elections.—The officers shall be elected, by ballot, at the January meeting and installed, and shall serve for one year or until their successors shall have been elected.

12. Presiding Officer.—In the absence of the president, the next succeeding officer shall take the chair.

13. Secretary-Treasurer.—The secretary-treasurer shall keep correct minutes of the proceedings of the meetings and send reports of the same to the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION and such journals and newspapers as he may deem proper. He shall preserve, on file, all reports and papers of every description presented to the Branch, and shall be charged with the necessary business and scientific correspondence. He shall read all papers handed to him by the president for the purpose, shall call and record ayes and nays whenever they are required to be called; shall notify the chairman of every standing and special committee of his appointment, giving him a list of his colleagues and stating the business upon which the committee is to act. He shall notify every member at least one week in advance of the time and place of each meeting. He shall collect and take charge of the funds of the Branch and shall give receipts for the same. He shall pay no money except upon order of the president and ac-

companied by proper vouchers. He shall present a statement of conditions at each January meeting of the Branch. He shall receive the amount of his expenses incident to the duties of his office.

14. Order of Business.—(1) *Reading of the minutes,* of the previous meeting; (2) *Introduction of newly elected members;* (3) *Unfinished or deferred business;* (4) *New business;* (5) *Program;* (6) *Nominations and elections;* (7) *Adjournment.*

15. Miscellaneous.—Every proposition to alter and amend these By-Laws shall be submitted in writing at any meeting of the Branch, and may be ballotted for at any subsequent meeting, when, upon receiving the votes of three-fourths of the members present, it shall become a part of the By-Laws.

16. Rules of Order.—On all points not specifically mentioned in the By-Laws governing this section the By-Laws of the AMERICAN PHARMACEUTICAL ASSOCIATION shall take precedence over the other decisions on parliamentary rule.

(*Motion No. 15*) *It is moved by Kelly that the application for the formation of the North Pacific Branch of the A. Ph. A. and the proposed Preamble and By-Laws be approved.* A vote on this motion is called for at this time but will be considered as tentative if there is objection or if any member wishes to discuss it.

53. Report of Auditors. The following report has been submitted:

February 10, 1933.

Mr. C. W. Holton, Treasurer,
AMERICAN PHARMACEUTICAL ASSOCIATION,
Baltimore, Maryland.

Dear Sir:

I have made an examination of the books and accounts of the AMERICAN PHARMACEUTICAL ASSOCIATION and your report as Treasurer, for the calendar year 1932, and *I hereby certify* that the total Cash and Securities on hand at December 31, 1932, amounting to $431,183.18, is correctly stated.

Real estate, represented by land and improvements in Washington, D. C., and known as Lots 3, 4, 5, 7, 12, 13, 14, 15, 16, 17, 801 and 802 in Square No. 62 are properly stated at a cost of $222,958.94, which with the Cash and Securities on hand aggregate a total value of $654,142.12.

All cash receipts have been traced to deposits in Bank to the credit of the respective funds for which received, and all disbursements have been found evidenced by properly authorized voucher checks.

Balances on deposit with the various Banks have been reconciled with Certificates from the Depositories, and Investment Securities held by the ASSOCIATION have been examined and found to be in agreement with the accounts shown by the records.

Interest accruing on bonds held for the account of the various trust funds has been promptly collected on their payment dates and deposited to the proper fund accounts. No default of interest has occurred in any Investment Securities held by the ASSOCIATION.

Records maintained by the Secretary of the ASSOCIATION have been examined and transfers of funds from his account to that of the Treasurer have been verified.

Respectfully submitted,
(Signed) W. A. JOHNSON,
Certified Public Accountant.

In order that the members of the Council and others interested may be informed, the following data is quoted from the Treasurer's report for the year:

JANUARY 1 TO DECEMBER 31, 1932.

BALANCE AND RECEIPTS.

Balance.

Cash in Merchants & Newark Trust Co., Newark, N. J.	$ 2,322.01	
Cash in Boston Penny Savings Bank	369.31	
Total Balance, January 1, 1932		$ 2,691.32

Receipts.

For the Current Fund:

From the Secretary (see account attached)	$27,437.33	
Interest on Deposit, Boston Penny Savings Bank	14.90	
Interest on Deposit, Merchants and Newark Trust Co.	6.90	
Interest on Headquarters Building Fund	9,166.40	
Interest on Life Membership Fund	1,559.30	
Estate of Franklin M. Apple	1,607.05	
Total Receipts for the Current Fund		$39,791.88

For the Permanent Funds:

Endowment	578.48	
Centennial	193.26	
Ebert Legacy	325.00	
Ebert Prize	42.50	
Life Membership	1,759.30	
Endowed Membership	3.40	
Research	2,657.86	
Headquarters Building	11,377.11	
Total Receipts for the Permanent Funds		$16,936.91

For the Trust Funds:

Wm. Procter, Jr. Monument	$ 632.76	
J. P. Remington Honor Medal	49.25	
Total Receipts for the Trust Funds		$ 682.01
Total Receipts		$57,410.80
Total Balance and Receipts		$60,102.12
Withdrawals from Permanent and Trust Funds as shown under Disbursements		26,431.04
Total		$86,533.16

DISBURSEMENTS AND BALANCE.

From the Current Fund.

General Expenses:

	Budget Appropriations.	Budget Disbursements.
•Salaries	$ 11,700.00	$ 11,200.00
Rent	1,020.00	1,020.00
Telegraph and Telephone	200.00	221.11
Clerical Expenses	1,600.00	1,604.00
Printing, Postage and Stationery	1,500.00	1,193.95
Office Supplies	200.00	201.97
Traveling Expenses	1,300.00	1,038.48

DISBURSEMENTS AND BALANCE. (*Continued.*)

Premium on Bonds	50.00	50.00
Auditing	75.00	75.00
Certificates	50.00	10.00
Miscellaneous	150.00	112.19
Scientific Section	25.00	39.10
Section on Education and Legislation	25.00	12.58
Section on Practical Pharmacy and Dispensing	25.00	10.39
Section on Commercial Interests	25.00	
Section on Historical Pharmacy	25.00	14.10
Commission on Proprietary Medicines	25.00	
Committee on Local Branches	25.00	
Committee on Membership	900.00	271.50
Committee on Legislation	50.00	
Committee on Syllabus	50.00	100.00
Committee on Unofficial Standards	50.00	65.00
Committee on Pharmacy Week	250.00	85.82
Drug Trade Bureau of Public Information	400.00	
International Pharmaceutical Federation	120.00	120.00
Metric Association	10.00	
American Conference on Hospital Service	25.00	25.00
Headquarters Building Campaign	2,000.00	1,512.90
Year Book	4,500.00	5,052.92
Library	100.00	4.00
Inter-Society Color Council	25.00	25.00
Pharmacy Week Window Strips	250.00	137.50
Total Appropriation for General Expenses	$ 26,750.00	
Total Disbursements for General Expenses		$ 24,202.51
Open Accounts:		
JOURNAL	$ 11,000.00	$ 14,033.75
National Formulary	1,000.00	2,087.20
Recipe Book	1,000.00	
Badges and Bars	50.00	
Total Budget Appropriations	$ 39,800.00	
Total Budget Disbursements		$ 40,323.46
Federal Taxes on Checks		2.48
		$ 40,325.94
From the Permanent Funds:		
Ebert Prize, Medal for 1932	$ 51.19	
Life Membership, Transfer of Interest	1,559.30	
Endowed Membership, Transfer of Interest	3.40	
Research, Awards for 1931–1932	1,650.06	
Research, National Conference on Pharmaceutical Research	25.02	
Research, Expenses for Reprints, etc.	117.10	
Headquarters Building, Transfer of Interest	9,166.40	
Headquarters Building, Architect's Fees and Expenses	8,451.55	
Headquarters Building, Interest on Mortgage	2,002.02	
Headquarters Building, Taxes	920.88	
Headquarters Building, Payment on Building	20,000.02	
Total Disbursements from Permanent Funds by Voucher Checks and Charges		$ 43,946.94

From the Trust Funds:		
Remington Honor Medal, Medal for 1932	$ 103.02	
Total Disbursements from Trust Funds by Voucher Checks		103.02
Total Disbursements		$ 84,375.90
Balance in Current Fund:		
Cash in Merchants and Newark Trust Co	$ 1,773.05	
Cash in Boston Penny Savings Bank	384.21	
Total Balance in Current Fund December 31, 1932		$ 2,157.26
Total Disbursements and Balance		$ 86 533.16

COMPARISON OF FUNDS.

Current Fund:	Dec. 31, 1931.	Dec. 31, 1932.
Cash in Merchants and Newark Trust Co	$ 2,322.01	$ 1,773.05
Cash in Boston Penny Savings Bank	369.31	384.21
Total Current Fund	$ 2,691.32	$ 2,157.26
Permanent Funds:		
Endowment Fund	$ 14,052.61	$ 14,631.09
Centennial Fund	5,359.19	5,552.45
Ebert Legacy Fund	7,629.82	7,954.82
Ebert Prize Fund	1,060.29	1,051.60
Life Membership Fund	41,009.81	41,209.81
Endowed Membership Fund	125.00	125.00
Research Fund	62,066.90	62,932.58
Headquarters Building Fund	501,303.19	500,591.00
Total Permanent Funds	$632,606.81	$634,048.35
Trust Funds:		
Wm. Procter, Jr. Monument Fund	$ 16,013.96	$ 16,646.72
Jos. P. Remington Honor Medal Fund	1,343.56	1,289.79
Total Trust Funds	$ 17,357.52	$ 17,936.51
Summary of Funds:		
Current Fund	$ 2,691.32	$ 2,157.26
Permanent Funds	$632,606.81	634,048.35
Trust Funds	17,357.52	17,936.51
Total Funds	$652,655.65	$654,142.12

SUMMARY OF ASSETS AND TRUST FUNDS.

	Dec. 31, 1929.	Dec. 31, 1930.	Dec. 31, 1931.	Dec. 31, 1932.
Current Fund	$ 1,656.82	$ 4,478.44	$ 2,691.32	$ 2,157.26
Permanent Funds	575,751.55	621,347.10	632,606.81	634,048.35
Total Assets	$577,408.37	$625,825.54	$635,298.13	$636,205.61
Trust Funds	16,162.85	16,769.71	17,357.52	17,936.51
	$593,571.22	$642,595.25	$652,655.65	$654,142.12

54. Sale of Bonds. The chairman of the Headquarters Building Campaign Committee wishes to report the sale of the $275,000 U. S. Treasury Bonds, 3%, 1951–1957, in the Headquarters Building Fund, at 98.5 and accrued interest, as funds were necessary to make payments on the Building in accordance with the terms of the contract. The price at which the bonds were sold was considered very satisfactory by our financial advisers and the sale was made after consultation with the president, the treasurer, the secretary, the chairman of the Council and the chairman of the Finance Committee.

The Building is now under roof and no extra costs over the contract have been necessary.

55. Applicants for Membership. The following applications properly endorsed and accompanied by the first year's dues have been received:

No. 66, Irwin Borover, 3409 East 119th St., Cleveland, Ohio; No. 67, Katharine E. Bowden, Librarian, Valparaiso University, Valparaiso, Ind.; No. 68, Isadore Feinstein, 2123 E. Baltimore St., Baltimore, Md.; No. 69, Maurice Finberg, 1666 East 118th St., Cleveland, Ohio; No. 70, Kenneth Foy, 11326 Miles Ave., Cleveland, Ohio; No. 71, Fred A. Geue, 448 Stark St., Portland, Oreg.; No. 72, W. Everette Griffith, P. O. Box 590, Mansfield, La.; No. 73, Bernard Henkin, 210 West 80th St., New York, N. Y.; No. 74, Lionel L. Houle, 2 Puertin St., West Warwick, R. I.; No. 75, Edward A. H. King, c/o Crookes Laboratories, Inc., 145 E. 57th St., New York, N. Y.; No. 76, Arthur J. Lane, 2nd and Mallinckrodt Sts., St. Louis, Mo.; No. 77, Morris Lindenbaum, 348 S. Bentalou St., Baltimore, Md.; No. 78, R. W. Lusby, 12th and E Sts., N. W., Washington, D. C.; No. 79, Charles J. T. McManus, 90 Providence St., Providence, R. I., No. 80, Louis Magid, College of Pharmacy, University of Florida, Gainesville, Fla.; No. 81, Emery Megyery, 1309 West Boulevard, Cleveland, Ohio; No. 82, D. L. Mendenhall, California College of Pharmacy, Parnassus and First Aves., San Francisco, Calif.; No. 83, John W. Morse, 1742 North Taylor Road, Cleveland, Ohio; No. 84, Mabel P. Onweller, Hudson, Mich.; No. 85, Robert William Rodman, 55 Park Ave., Bloomfield, N. J.; No. 86, E. J. Starwalt, 623 East Olive Ave., Monrovia, Calif.; No. 87, Geo. W. Steelhammer, Silverton, Oreg.; No. 88, Ercell D. Tebow, Drawer A., Norman, Okla.; No. 89, W. H. van Rossen, c/o Surgident, Ltd., 666 No. Robertson Blvd., West Hollywood, Calif.; No. 90, George A. Vosnek, 619 N. Lake St., Madison, Wis. (Assoc.); No. 91, August J. Watzlavick, Schulenburg, Texas; No. 92, Harry Weis, 639 Washington St., Portland, Oreg.; No. 93, George L. Weldon, 619 Frederica St., Owensboro, Ky.; No. 94, John Thomas Witty, 1700 N. E. Union Ave., Portland, Oreg.; No. 95, Geo. Ernest Wolf, 3414 Chesley Ave., Baltimore, Md.; No. 96, Irvin V. Wolf, 121 Quadrangle, Iowa City, Iowa; No. 97, Merle M. Woodward, 1716 W. Hillsdale, Lansing, Mich.; No. 98, Thomas Gorsuch Wright, 1928 E. 31st St., Baltimore, Md.; No. 99, Ladimer Yunger, 4009 East 146th St., Cleveland, Ohio (Assoc.).

(*Motion No. 16*) *Vote on applications for membership in the American Pharmaceutical Association.*

LETTER NO. 7.

To the Members of the Council:

56. Distribution of Beer and Other Malt Beverages through Drug Stores. Since the suggestion that drug stores might be considered in this connection, the proposal has been the subject of considerable discussion in the pharmaceutical and lay press. In the recent discussion in Congress of the Celler Bill, which was intended to remove the restrictions on the prescribing of alcoholic liquors, it was suggested that beer be included and an amendment to that effect was adopted by the House of Representatives. This amendment was not approved by the Judiciary Committee of the Senate when the bill was referred to that committee and the bill was not considered by the Senate before adjournment because of objection.

For these reasons and because it is believed that the AMERICAN PHARMACEUTICAL ASSOCIATION should place itself on record at this time and before its next annual meeting, in opposition to this proposal in whatever form it may take, the Council is requested to act upon the following resolution. President Philip, President-Elect Swain, Chairman Hilton, Dr. James H. Beal and others have expressed the opinion that the Council should act for the ASSOCIATION under the conditions.

(*Motion No. 17*) *It is moved by Philip that the following resolution be approved, that the secretary be requested to promptly give publicity to this action and that the president and secretary be authorized to invite the state pharmaceutical*

associations, through the appropriate officials, to take similar action.

WHEREAS, during recent discussions in the Congress of legislation proposed to legalize the manufacture and distribution of alcoholic liquors for beverage purposes, it was suggested that malt liquors might be distributed through drug stores, and

WHEREAS, the pharmacists of the United States are now charged by law, with the difficult duty of distributing on prescription, alcoholic liquors for medicinal purposes, the proper discharge of which duty requires for the best interests of public welfare and public health, that it be kept strictly separated from the distribution of such liquors as beverages, and

WHEREAS, it must be apparent from the platforms of both political parties, that alcoholic beer and other malt liquors are wanted by the people as beverages and not as medicines, and that they must be distributed under the strictest police supervision and regulation, and

WHEREAS, the distribution of alcoholic malt beverages in drug stores would be most inappropriate because it would be contrary to the essential purpose and important responsibilities of pharmacy in relation to the people and to public health, and because, through such distribution, an activity foreign to its purposes and ethics would be introduced, therefore, be it

Resolved, that the AMERICAN PHARMACEUTICAL ASSOCIATION hereby records its earnest protest against any legislation permitting or requiring pharmacists to distribute beer and other alcoholic malt beverages in any form and of any higher alcoholic strength, for beverage purposes, and be it further

Resolved, that copies of this resolution be forwarded to the President of the United States, the President of the Senate, and the Speaker of the House of Representatives, with the request that officials of the ASSOCIATION be heard in connection with the further consideration of such proposed legislation.

With the approval of the chairman of the Council, a vote is called for. If there is objection or comment the vote will be considered as tentative.

E. F. KELLY, *Secretary*.

WALTER G. CAMPBELL RESIGNS AS DIRECTOR OF REGULATORY WORK, U. S. DEPARTMENT, FOOD AND DRUG ADMINISTRATION.

Walter G. Campbell, Director of Regulatory Work in the U. S. Department of Agriculture, has resigned to become Chief of the Food and Drug Adminstration in the department. The position of Director of Regulatory Work has been abolished, thus completing the reorganization of the department's law-enforcement work started in 1923. Secretary Wallace drafted Mr. Campbell, then acting chief of the Bureau of Chemistry, originally charged with the enforcement of the Food and Drugs Act, to assist him in coördinating and improving the law-enforcement activities of the department. Under Mr. Campbell's direction, Secretary Hyde points out, the regulatory work has been grouped under responsible heads of major units and is now so organized that a Director of Regulatory Work is no longer necessary. Mr. Campbell was appointed in 1907 to be chief food and drug inspector, a position which he held until 1914, when he was placed in charge of the Eastern Inspection District of the Bureau of Chemistry. He was appointed assistant chief of the bureau in 1916 and acting chief in 1921.

DANISH EXHIBIT AT THE CHICAGO MUSEUM OF SCIENCE AND INDUSTRY.

"In the field of electricity Hans Christian Oersted ranks with Michael Faraday. His discovery of electromagnetism forms, together with Faraday's discovery of electromagnetic induction, the foundation of the age of electric power. During his great career Oersted founded both the Danish Society for the Propagation of Science and the Polytechnic Institute. Replicas of his original apparatus, of his electromagnet, and a copy of his essay on his great discovery will form part of the Danish gift to the Museum of Science and Industry. A bronze tablet commemorating the centenary of Oersted's discovery of electromagnetism has already been given to the museum by Dr. Neils C. Oatved, of Detroit, Michigan."—*Science*, February 24, 1933.

Hans Christian Oersted was one of "The Two Sons of a Danish Apothecary" immortalized by Hans Christian Anderson.—See JOURNAL A. PH. A. for April 1931, page 368.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter.

BALTIMORE.

On February 16th the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was addressed by Dr. David I. Macht, who spoke as a scientific investigator in experimental medicine. He had for his subject "Alcohol and Alcohols."

Doctor Macht gave a brief survey of the prominence of alcohol as a drug. He touched upon the present-day theories regarding the pharmacologic action of ethyl alcohol and its use as a food. He referred to his own researches in this field and related how he had studied the narcotic action of the higher alcohols. Of particular importance was the reference which the speaker made to a European volume dealing with alcohol and a comparable volume recently published in this country—"Alcohol and Man." Because the sociological aspects of the problem are so complex he did not elaborate upon them in his illuminating discussion.

At the conclusion of Doctor Macht's address many of the members questioned him regarding various points he had touched upon. The paper was discussed by Messrs. Solomon, Glassford, DuMez and Reindollar; Dr. Macht graciously commented on their remarks.

Approximately fifty-five attended the meeting. Many students from the School of Pharmacy and the School of Medicine of the University of Maryland were present. It was particularly gratifying to the officers of the Branch to see such a fine attendance.

C. JELLEFF CARR, *Secretary-Treasurer.*

CHICAGO.

The 210th meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on January 24, 1933, at the University of Illinois College of Pharmacy, 715 S. Wood Street.

The meeting was opened with the report of the Committee on Nominations, who submitted the following nominations for officers for the ensuing year:

President, R. E. Terry; *First Vice-President*, G. L. Webster; *Second Vice-President*, R. A. G. Linke; *Third Vice-President*, S. W. Morrison; *Secretary-Treasurer*, Lawrence Templeton.

Committee Chairmen: *Membership*, Thomas F. Rylanda; *Legislation*, J. Riemenschneider; *Practice*, I. A. Becker; *Medical Relations*, Dr. Bernard Fantus; *Publicity*, Samuel C. Henry.

A unanimous vote was given to adopt the selection of the nominating committee.

President Terry outlined the following programs for the remainder of the year:

February 21st—"Some of the Newer Forms of Medical Practice," by Dr. Leland of the American Medical Association.

March—"Acres of Diamonds," by Prof. Anton Hogstad, Jr.

April—"Plans for Pharmacy at the World's Fair," by H. C. Christensen.

May—"Research on Vehicles," by Dr. Bernard Fantus.

This meeting marked the beginning of the 28th year of the Chicago Branch—the meeting was dedicated to reminiscences of members and occurrences during those many years.

Prof. Clyde M. Snow, of the Pharmacy School, who was a member of the group forming the branch, delivered a very interesting history of the branch during its twenty-eight years of existence. This history contains the names of many men who have had a profound influence on the advance of pharmacy.

Dr. Bernard Fantus expressed the sentiment of the members when he suggested that the history be revised to include more of the work that had been done by the author of the history, Professor Snow. The history is undergoing a revision at this time and will be printed in the near future.

LAWRENCE TEMPLETON, *Secretary.*

FEBRUARY.

The 211th meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held February 21, 1933, at the University of Illinois College of Pharmacy.

The speaker of the evening was Dr. Leland, Director of the Bureau of Medical Practice of the American Medical Association, whose subject was, "Some of the Newer Forms of Medical Practice."

Dr. Leland began his talk by mentioning that the American Medical Association has a council on Pharmacy and Chemistry, showing that the association is interested in the closely associated professions and sciences.

Dr. Leland laid the foundation for his discussion of some present-day practices in medicine by giving some of the early history of health insurance.

Bismark started health insurance in Europe. There are various reports as to its success. Contract practice or health insurance schemes began as long ago as 1790 in this country. As we follow this type of medical practice we find that at the time of the Civil War the plantation owners were employing this for the care of their help.

Railroads, lumbering companies, mining companies, etc., adopted the contract practice for providing for the health of their employees. The American Medical Association does not now condemn all types of contract practice, as it is necessary in isolated districts far away from the urban centers.

Now many hospitals and health organizations have adopted the written contract instead of the implied contract. In some places the contract system has escaped from the control of organized medicine. The objection to commercialism of this type of medical practice is that soliciting, under-bidding and misrepresentation occurs when the competition becomes too great. This is not a cross section of medical practice to-day, but something which is disturbing the medical practice and growing in some sections.

In Europe, where in some countries health insurance has been adopted, illness has increased. The people feel that they have paid for medical care and that they have something coming, in many cases taking advantage of the situation.

People who have this health insurance many times are not getting what they think they are. In most cases the rates for the insurance are inadequate and are not economically sound. Some concerns are giving good service under the contract system while others are giving terrible service. The profession feels that a promoter should not be placed between the physician and the public.

With the growth of this type of practice there is the possibility of a nation-wide organization of millions of policy buyers. Such an organization could wield an influence on hospitals, doctors, pharmaceutical houses, etc., for favoritism or lower prices.

There is usually a selfish motive in most of the organizations springing up. The doctors who render the services usually get a very small percentage of the intake of these concerns.

There are some organizations formed for the reduction of cost of medical care who are very ethical. The American Medical Association is fighting against those organizations who are trying to commercialize and promote the profession, not for the welfare of the public, but for their own profit.

Dr. Leland closed this very interesting discussion by stating that there are many places where group practice has been successful and the American Medical Association has thought it best not to devise a plan for the entire country, but to handle local conditions as they deem best for the profession and the public.

A vote of thanks was tendered Dr. Leland.

LAWRENCE TEMPLETON, *Secretary.*

DETROIT.

The January meeting of the Detroit Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held in the Y. M. C. A. Building, preceded by a dinner. President Robert Fleisher called the meeting to order, and the

minutes of the previous meeting were read by the secretary and approved.

President Fleisher then introduced the speaker of the evening, Dr. Claude E. Duchess, of the Medical Service Department of Parke, Davis & Co., who spoke on "Medicine and Pharmacy Interlocking Professions." He said the doctor and the druggist play an important part in the welfare of the community and many opportunities for coöperation present themselves to both professions for the good of the patient and the community.

A general discussion followed led by Dr. G. H. Dikeman, manager of Mutual Drug Co., who took the physician to task for aiding in the exploiting of patent medicines by prescribing them for his patients.

Dr. Duchess said this condition existed because of the vast army of detail men employed by the manufacturer to-day placing information before the physician in this era of new medicines, some of which have merit and have their place.

Dean R. T. Lakey said the type of training given to pharmacy students may have to be revised to meet the ever-changing trend in the art of medication. He said the training given the student to-day does not go far enough into pharmacology. In the modern medicines many changes occur, complicated reactions are affected both chemically and physiologically. Bacteriology and physiology must be developed to a higher degree. He said reformers threaten to revolutionize medical service—the doctor, druggist and dentist must get together to protect interdependent interests.

Mr. Dox compared the old-time physician with the present and referred to the vast changes in the art of prescription writing.

BERNARD A. BIALK, *Secretary.*

TESTIMONIAL DINNER TO DIRECTOR E. J. PARR.

Detroit Branch of AMERICAN PHARMACEUTICAL ASSOCIATION tendered a testimonial dinner, on February 21st, to Ernest J. Parr, new director of drugs and drug stores. A representative group of pharmacists attended to pay tribute to the Director. All members of the Michigan Board of Pharmacy were present: *President*, Howard Hurd, of Flint; Duncan Weaver, of Fenville; Earl Durham, of Coruna; M. N. Henry, of Lowell, and President Clare F. Allan, of Wyandotte, of the National Association Boards of Pharmacy. Mrs. Durham, Mrs. Weaver and Mrs. Allan added color to the speakers' table.

The National Association of Colleges of Pharmacy was represented by Prof. Charles H. Stocking of the University of Michigan. The colleges of pharmacy were represented by Dean Edward H. Kraus of the University of Michigan, Dean R. T. Lakey, Prof. J. L. Dorion of Detroit Institute of Technology, and Prof. E. H. Wisner of Ferris Institute. The latter was also represented by E. E. Brown, its new president.

The inspectors were represented by Ed. J. Meyer; the N. A. R. D. by John H. Webster, *former president;* the D. R. D. A. by President J. Walter Runciman; and the U. S. P. and N. F. Revision Committee by Leonard A. Seltzer and J. Ed. Richardson, former president of the Board of Pharmacy.

The attendance at the meeting was considerably increased by the students of the colleges of pharmacy and the pharmacy staff of the University Hospital in Ann Arbor headed by Harvey A. Whitney, who also paid tribute to the new director.

The selection of Mr. Parr for director of drugs and drug stores is very popular. The key-note of the many speakers seemed to be in harmony with an eagerness to coöperate with the new director to bring about better conditions in pharmacy in Michigan and a superb confidence that pharmacy would be greatly benefited under the directorship and guidance of Director Parr.

The meeting of the Branch was called to order by President Robert Fleisher, who introduced Felix Johnson of the College of Pharmacy of the University of Michigan, First Vice-President of the Branch, and extended to him the courtesy of the floor.

The minutes of the January meeting were read by the secretary and approved as read. Mr. Parr was presented at this time by President Fleisher. He paid tribute to the late H. H. Hoffman and Garfield Benedict, the retiring director, for laying the foundation and pledged that he would work to carry on in accordance with some of his ideas and ideals for pharmacy.

The retail druggist must promote legislation to protect public health. He suggested the control of public health through medical, nursing and pharmaceutical associations working in complete harmony. While raising the standards of pharmacy is a step in the right direction, Mr. Parr suggested something should be

done to guarantee the student a fair return for his efforts.

To-day the student has the chain store, the patent medicine store, the vendor and other menaces to contend with; he said the public is beginning to realize the critical condition of the retailer and suggested complete coöperation of all concerned to improve conditions. A study of the National Model Pharmacy Law is being made by Mr. Parr in the hope of bringing about suitable legislation in Michigan. He thanked the assembly for the wonderful reception given to him and invited every pharmacist to make his office at Lansing headquarters when in the Capital City.

Dean Lakey responded and said that Michigan Pharmacy had a real leader in the new director; he also announced that Prof. Anton Hogstad, head of National Pharmacy Week, would be the speaker at the March meeting of the A. PH. A. Branch meeting.

Dean Kraus said that since hearing Mr. Parr to-night he was more confident than ever in the future of Michigan Pharmacy. He announced plans for the annual May meeting held in Ann Arbor; the date is to be Thursday, May 11, 1933. The speaker is to be Prof. Carl D. LaRue who will give an illustrated lecture on "Some Observations on Drug Collections in the Tropics, Including Sumatra, Java and Brazil." The Pharmaceutical Conference which proved so successful last year will be repeated. The opening address of welcome will be delivered by Dr. Alexander G. Ruthven, president of the University of Michigan. Other noted speakers include Dr. C. W. Edmunds, member of the U. S. P. Revision Committee; he will speak on "Drug Addiction as a World Menace;" Prof. L. L. Watkins, of the Department of Economics, will speak on "The Economic Condition of the World;" Prof. R. W. Bunting, of the School of Dentistry, will speak on "The Decay of Teeth;" H. C. Christensen, of Chicago, will speak on a subject of national importance and Dr. Nathan Sinai will speak on "The Study of the Costs of Medical Care."

This brought to a close one of the most enthusiastic meetings in the history of the Detroit Branch.

BERNARD A. BIALK, *Secretary.*

NEW YORK.

The February meeting of New York Branch, of the AMERICAN PHARMACEUTICAL ASSOCIATION, was held February 20th, at the College of Pharmacy, Columbia University, with about seventy members present. The new president, Ernest Bilhuber, presided. The minutes of the previous meeting were read and approved, also the report of Treasurer Currens.

Chairman Lehman, of the Committee on Education and Legislation, reported that the Capper-Kelly Bill will not come up for action at this session of Congress; the Copeland Bill, amending the Clayton Act, has been postponed; he said repeal of the 18th Amendment seems assured. Relative to state legislation, the chairman reported introduction of a New York State Fair Trade bill (similar to the Junior Capper-Kelly Bill), of an Anti-Discrimination bill (this compels those operating more than one store to maintain the same price on the same goods in all of these stores). The Committee on Education of New York Senate has reported favorably the bill which gives the State Board of Pharmacy jurisdiction over the sales of drugs and preparations, containing poisonous, habit-forming or deleterious substances.

Chairman Lehman referred to lack of support for the Committee on Legislative Matters; Mr. Currens urged that differences of groups be settled before the delegation goes to Albany, and there present a united front.

Hugo H. Schaefer moved that Chairman Lehman address various organizations of the drug-trade activities to form a legislative committee representative of the whole industry. Carried.

Chairman Kassner reported that he was organizing a large committee on membership and urged members to enlarge the membership of the Branch. The application of Harry Handsman for membership in the Branch was submitted and approved. Dr. H. V. Arny reported that a branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was in the process of organization in New Jersey. President Bilhuber appointed Dr. Schaefer, *Chairman* of a committee to confer with the interested parties in New Jersey; the other members of this committee are Messrs. Ballard and Lehman; alternate, J. Leon Lascoff.

President Bilhuber introduced Joseph J. Hammer, as speaker of the evening, who spoke on "A Plan for Easing the Credit Situation." He referred to the favorable reception given him, especially by the "Credit Mens' Round Table." The reason for his gratification was, that only through the coöperation of these

men could the plan be put into operation and notwithstanding that he had placed the responsibility for the difficulties on them, they were willing to discuss the matter further with a desire to coöperate with the retailers in stabilizing the industry.

He did not consider the plan a panacea but of value in restoring confidence and to correct certain evils that had crept in. He referred to the large relative number of failures in the retail drug business. The greater part of his address was devoted to the cause of drug store failures and the number of stores that might have been saved. He placed the onus of the evils on the credit managers and in support of his contention referred to a number of actual experiences of arbitrary and destructive conduct. He stated that he was not unmindful of the trials and tribulations of the manufacturers and wholesalers and the number of unscrupulous attorneys. He contended that blind, irrational and hasty rush of creditors seeking the collection of their debts is ruinous to all parties. He considered that in practically all cases, forced liquidation brought little return and resulted in destruction. In his opinion voluntary readjustments through equitable moratoriums, extensions or compositions of debts, presents the only prudent method. Frequently it is the obstruction of minority creditors that prevents settlement. He referred to the plan laid before the fifth annual convention of the New York Pharmaceutical Conference, in which he had provided for the formation of the Pharmaceutical Credit Board—to act as a clearing board of retailers, manufacturers and wholesalers and then, when debtors seek readjustment of their financial affairs with their creditors, they may appear before the Board and submit themselves to its jurisdiction. In such an event, he said, "all member creditors would, *ipso facto*, be stayed and restrained from the legal enforcement of their claims pending the investigation and final determination of the Board." In that way a pharmacist would be permitted to continue in business, the assets would be conserved and the plan developed whereby settlement can be affected and better protection given to all parties concerned. He maintained that the pharmaceutical manufacturer and wholesaler, dealing directly with the retailer, owed a duty to the retailer in the hour of need. He pointed out that manufacturers and wholesalers owed their success largely to the retailer and all that the retailers ask is coöperation so that they may continue in business. He also called attention of the A1 credit risk given by Dun and Bradstreet in the classification of the retailer. If the average pharmacist is given reasonable encouragement he will do everything possible to meet his just debts. He invited the credit men to make the Credit Board possible and effective.

Mr. Hammer also referred to the fact that the La Guardia Costigan bankruptcy bill is to be passed by Congress. This bill proposes a modification of the bankruptcy law along the lines he had indicated in his remarks. A man in financial difficulties will file a petition with the Federal Court asking for a conference with his creditors with a view of obtaining an equitable moratorium, adjustment arrangement, with his creditors. He also referred to the New York Pharmacy Ownership Law which has been declared unconstitutional.

Lengthy discussion followed Mr. Hammer's address and indicated the great interest in this subject. Several members of New York Credit Mens' Round Table took an active part in the discussion. Mr. Cunningham agreed that if a central credit organization with sufficient authority could be organized, it would be helpful. Mr. Zeitlin pointed out that individual agreements with creditors had been made and worked out satisfactorily.

Mr. Gesoalde suggested that the president of the New York Pharmaceutical Conference and Mr. Hammer meet with the credit men to discuss such a proposed plan and put it into operation, if possible.

Mr. Currens assured Mr. Hammer that the credit men would be willing to coöperate.

A unanimous rising vote was given the speaker.

RUDOLF HAUCK, *Secretary.*

THE ACADEMY OF PHARMACY AND NORTHERN OHIO BRANCH A. PH. A.

The Academy of Pharmacy and Northern Ohio Branch of the A. PH. A., *Bulletin 1* for 1933, issued to physicians, carried with it two prescription suggestions, one for Cough Syrup and one for an Expectorant Mixture. Three other formulas were included; they are:

"1. Potassium Guaiacol Sulphonate, Ammonium Chloride, and Chloroform in a vehicle of Syrup of Wild Cherry and Red Aromatic Elixir.

"2. Mixtura Glycyrrhizæ Composita, Tartar Emetic, Paregoric, Spirit of Nitrous Ether, Glycerin and Water. Sometimes Ammonium Chloride is added to this mixture.

"3. Codeine Sulphate and Diluted Phosphoric Acid in a vehicle of Syrup of Wild Cherry, Codeine Alkaloid. (Codeine Sulphate and Codeine Phosphate may be used interchangeably in a vehicle, as their action is the same and the Pharmacopœia gives the same dose, 0.03 Gm., gr. *ss.* for each.) Codeine Sulphate contains 76% of anhydrous Codeine, and 1 Gm. dissolves in 30 cc. of Water and in 1280 cc. of Alcohol. Heat increases solubility. Codeine Phosphate contains 67% of anhydrous Codeine, and 1 Gm. dissolves in 2.3 cc. of Water and in 325 cc. of Alcohol. Heat increases solubility. Because of its greater solubility the phosphate should be indicated in highly alcoholic preparations."—THE ACADEMY OF PHARMACY.

Bulletin No. 2 has as a subject, "Sprays." Other formulas are given and reference is also made to the formulas of the National Formulary.

Nebula Aromatica. **Nebul. Arom.** contains 0.2 Gm. each of Phenol and Menthol; 0.1 Gm. Thymol; 0.3 Gm. each of Camphor and Benzoic Acid; 0.2 cc. each of Eucalyptol, Oil of Cinnamon and Oil of Clove; 0.5 cc. Methyl Salicylate (Oil of Wintergreen) in Light Liquid Petrolatum to make 100 cc.

Nebula Mentholis Composita. **Nebul. Menthol Co.** contains 1 Gm. each of Camphor and Menthol; 0.3 cc. of Methyl Salicylate; 0.2 cc. each of Eucalyptol and Oil of Cinnamon in Light Liquid Petrolatum to make 100 cc.

Nebula Eucalyptolis. **Nebul. Eucalyptol.** contains 5% Eucalyptol in Light Liquid Petrolatum.

Nebula Mentholis. **Nebul. Menthol.** contains 2% Menthol in Light Liquid Petrolatum.

One of the most common preparations, used as drops in the nose, consists of Camphor, Menthol and Light Liquid Petrolatum. This is sometimes known as C. M. A. nose drops. The quantity of Camphor and Menthol varies from $2^1/_2$ grains, each, to the fluidounce to 1 grain of each. One per cent of Ephedrine may be added, if so desired.

Ephedrine is used in the nostrils to shrink the congested mucosa in rhinitis and sinusitis. Local application to mucous membranes . . . contracts the capillaries to a moderate degree and thus diminishes hyperemia and reduces swelling. One per cent, in oil, may be used for local application to mucous membranes (N. N. R.). See our *Bulletin No. 7*, 1932, for literature upon Ephedrine.—THE ACADEMY OF PHARMACY.

PHILADELPHIA.

The February meeting of the Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held February 13, 1933, at the Philadelphia College of Pharmacy and Science. The meeting was brought to order at 8:30 by President Stoneback, and the minutes of the previous meeting read and approved. Mr. Douglas Krebs and Mr. George Tushim were accepted as members of the Local Branch.

A Nominating Committee, consisting of W. L. Cliffe, *Chairman;* James C. Munch and Adley B. Nichols, was appointed to consider candidates for the annual election of officers to be held at the next meeting.

J. B. Treichel, chemist to the MacAndrews and Forbes Company, of Camden, New Jersey, as guest speaker of the evening presented a talk on Licorice entitled, "Putting a Weed to Work." Several reels of excellent moving pictures formed an interesting feature. During the course of the lecture Mr. Treichel discussed the history and cultivation of licorice; its chemistry and pharmacognosy; the preparation of licorice extracts; and the use of the waste fibre in making paper, fibre board and other similar materials. Especially emphasized was the use of secondary licorice extract, in combination with certain chemicals, for the production of fire-resisting foam in various forms of fire extinguishers. Mr. Treichel produced typical fires in miniature on the lecture table, and promptly extinguished them with the foam from several forms of apparatus containing the licorice mixture. The spectacular nature of the demonstrations was applauded by the large audience.

E. H. MACLAUGHLIN, *Secretary.*

PITTSBURGH.

JANUARY.

A well-attended meeting of the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held January 17, 1933, at the Pittsburgh College of Pharmacy. Dr. J. H. Wurdack, president of the Branch, presided. The minutes of the previous meeting were read and approved. A communication from Dr. A. H. Horvath was read. Dr. Horvath was unavoidably detained in New York, consequently his lecture on "Soy Bean" was deferred.

The president appointed the following nominating committee to report at the regular meeting in February: E. C. Reif, A. F. Judd, Louis Saalbach.

The speaker of the evening, Dr. E. C. Reif, was introduced. Professor Reif gave a very instructive talk on "Hypnotics." He considered at length "Barbituric Acid Derivatives" in a manner that was very interesting to pharmacists. Dr. Reif later answered many questions brought up during the discussion that followed.

A rising vote of thanks was accorded Dr. Reif.

FRANK S. MCGINNIS, *Secretary.*

FEBRUARY.

The February meeting of the Pittsburgh branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held February 21, 1933, at the Pittsburgh College of Pharmacy. Dr. J. H. Wurdack presided. Robert W. Taylor was appointed to act as secretary, *pro-tem.* The minutes of the January meeting were read and approved.

President Wurdack introduced Dr. C. Leonard O'Connell. Professor O'Connell reported as delegate to the house of delegates, at the Toronto meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION. He considered the resolutions that were adopted at the last convention and discussed those that had a direct bearing upon the activity of the Pittsburgh Branch.

In summarizing, Dr. O'Connell made many suggestions. He indicated to the group the vital necessity of combining our forces, in our metropolitan area, into a strong society of pharmacists, regardless of whether we are engaged in retail capacity, hospital pharmacies, wholesale or manufacturers' distributors, or serving as members of teaching staffs. Dr. O'Connell stressed that the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION should be the organization to foster the activity and professional association of pharmacists in our section.

The president then presented Frank S. McGinnis, who read a paper on the findings of the committee on Costs of Medical Care. The available report of the Committee, resulting from a five-year study under the chairmanship of Dr. Ray Lyman Wilbur, was also considered.

The majority and chief minority recommendations were presented and indication was made that organized medicine had sufficient reason to support the chief minority recommendations of the committee. Mr. McGinnis further presented a compilation of facts and findings taken from a publication entitled "The Costs of Medicines" by C. Rufus Rorem and Robert P. Fischelis, prepared for the Committee on the Costs of Medical Care. Of the many points brought out it was interesting to learn that the annual bill for medicines in the United States is approximately 715,000,000 dollars. The distribution of this amount of money was made as follows: Home Remedies, $165,000,000; Patent Medicines, $360,000,000; Physicians' Prescriptions, $190,000,000.

Much discussion followed the presentation of the paper. Brought out in the discussion was the fact that at present there are 133,000 pharmacists in the United States. It was deemed necessary that an exerted effort should be made to increase membership in our parent body, the AMERICAN PHARMACEUTICAL ASSOCIATION. It was estimated that of the total number of pharmacists in the United States, about five per cent pay dues to the AMERICAN PHARMACEUTICAL ASSOCIATION.

The next order of business was the report of the Committee on nominations. Dr. E. C. Reif reported for the committee as follows: *President*, Clarence T. Van Meter; *Vice-President*, Bernard F. Daubert; *Secretary-Treasurer*, Frank S. McGinnis; *Delegate to House of Delegates*, C. Leonard O'Connell. A ballot was cast by Mr. Raymond Hornfeck, unanimously electing the nominees.

Dr. J. H. Wurdack, on retiring from office, urged upon the newly elected officers the opportunity for serving, and the responsibility in developing one of the strongest units in organized pharmacy—the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Mr. Van Meter assumed the office of president and pledged his effort in developing this strong pharmaceutical society.

ROBERT W. TAYLOR, *Secretary, Pro-tem.*

STUDENT BRANCH.

The Pittsburgh College of Pharmacy Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION met Friday, February 24th, with the entire student body in attendance. It was the opening meeting of the new semester and Paul Geer, who presided, introduced the new representatives who had been selected by their respective classes for the ensuing year. The representatives—Mr. Theil, Senior; Mr. Gabig, Junior; Mr. Lewis,

Sophomore; and Mr. Schindel, Freshman—spoke briefly of their plans for the year and requested coöperation from the entire group. The Dean, Dr. C. Leonard O'Connell, asked the students to decide what they wanted their organization to accomplish and offered full coöperation of himself and the professional staff to help attain any end that the organization might have in mind. Dr. O'Connell also pointed out the unique fact that probably no pharmacy college in this country thus far could, like the Pittsburgh Student Branch, have present at one meeting, four duly accredited delegates to four consecutive national conventions. These four men who were present were Mr. Dolyak who was at Rapid City in 1929, Mr. DeBone who was at Baltimore in 1930, Mr. Theil who was at Miami in 1931, and Mr. Zalevsky who was at Toronto in 1932. Mr. DeBone, in concluding the meeting, presented an amusing as well as interesting talk on Chinese Medicine. Adjournment followed.

It is planned that the new class representatives will meet in the very near future to organize and elect officers.

SIDNEY M. ZALEVSKY, *Secretary.*

MARCH 2ND.

At a meeting of the delegates held March second, it was decided that the student branch shall, in the future, hold monthly meetings; new officers were installed and are as follows: *President*, John Theil; *Vice-President*, John Gabig; *Secretary*, Greyson Lewis; *Treasurer*, Arthur Schindel.

GREYSON P. LEWIS, *Secretary.*

NORTHWESTERN BRANCH.

A joint session of the Minnesota Pharmaceutical Association and the Northwestern Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held February 8th. Dean Frederick J. Wulling presided with assistance of Rugnar Almin, president of the Branch. Dean Wulling read his address and reports were made by committees: On *College of Pharmacy*, Oscar M. Nordrum; *Drug Plant Culture*, E. B. Fischer; *Practical Pharmacy*, R. H. G. Netz; on *Research*, C. H. Rogers; *Hospital Pharmacists*, Sister St. George; *U. S. P. and N. F. Revision*, F. A. U. Smith; on *Adulteration*, Rugnar Almin; *Public Health*, John Connell; *Fellowship*, N. Vere Sanders; *History* and *Educational Conference*, Frederick J. Wulling; Rho Chi, George Crossen; *Interprofessional Relationships*, Dr. John O. Taft; *Dentists*, Dr. C. O. Flagstad; *Minnesota Fellowship*, Karl Goldner; *Drying Drugs and Medicinal Plant Garden*, E. B. Fischer.

Papers were read by C. V. Netz; *Volatile Oil of Chrysanthemum balsamita*, E. B. Fischer and R. F. Voigt; *Some Interesting Rare Sugars*, C. H. Rogers; *Ephedrine*, Miss Laurine Jack. Remarks and Addresses: Dr. David F. Jones, H. C. Kruckeberg, George T. Kermott, Dr. R. E. Scammon, Dr. William A. O'Brien, Frederick J. Wulling; *Historical Pharmaceutical Material*, Willoughly M. Babcock; *The Importance of Experimental Pharmacology*, Prof. Marvin R. Thompson; *U. S. P.* and *N. F.*, Gustav Bachman. Presentation Minnesota State Pharmaceutical Association Scholarship Token, President Iverson.

MERGER OF RETAIL GROUPS.

A merger of five Brooklyn, N. Y., retail druggists' groups under the name of the Brooklyn Pharmaceutical Association was effected February 7th, at a meeting at the Brooklyn Elks Club under the auspices of the New York Pharmaceutical Conference. Nicholas S. Gesoalde, president of the Associated Pharmacists of Brooklyn, one of the five groups to combine, was elected *Temporary Chairman*. The other organizations are the Brooklyn Retail Druggists Association, Brownsville Apothecaries Society, Greenpoint Pharmaceutical Association, and the Pharmaceutical Society of East New York.

NEW YORK ACADEMY OF PHARMACY.

The Academy of Pharmacy elected Dr. C. P. Wimmer, professor of Pharmacy at the Columbia University School of Pharmacy, *President;* other officers were elected, as follows: *First Vice-President*, Dr. William C. Anderson; *Second Vice-President*, Dr. George C. Diekman; *Third Vice-President*, Dr. J. Leon Lascoff; *Treasurer*, F. C. A. Schaefer; *Secretary*, Nicholas S. Gesoalde. The Academy of Pharmacy is an organization devoted to furthering the professional interests of the pharmacist and his relationship with the medical profession.

N. Y. DRUG AND CHEMICAL CLUB.

Election of officers of the Drug & Chemical Club, New York City, held February 21st, resulted as follows: *President*, S. B. Penick; *Vice-President*, C. C. Gardner; *Secretary*, William P. Brinckerhoff, succeeding Joseph Huisking; *Treasurer*, A. A. Wasserscheidt.

NEW PHARMACOPŒIAL VITAMIN ADVISORY BOARD.

BY E. FULLERTON COOK, CHAIRMAN, U. S. P. XI COMMITTEE OF REVISION.

When the U. S. P. X appeared in 1925 its vitamin standards for Cod Liver Oil represented the latest and most authoritative knowledge concerning vitamin A and, while the presence of another factor was recognized, it was spoken of as "antirachitic activity" and the term "vitamin D" was only subsequently established. In the rapid development, during the past six years, of the knowledge concerning the place occupied by vitamins in nutrition and health, it has been considered desirable for the Pharmacopœia to announce an Interim Revision of its Cod Liver Oil standards and of the methods for their determination.

Following a well-established policy of the U. S. P. Committee of Revision, a conference on vitamins was announced, and those interested were invited to attend. This group, about twenty-five in number, organized into a U. S. P. Vitamin Advisory Committee and prepared a report for submission to a Vitamin Conference which had been called by the Health Organization of the League of Nations to be held in London, on June 17, 1931. Three of the members of our Vitamin Advisory Committee were in attendance at the London Conference.

When the results of the London Conference were made available a second meeting of the U. S. Pharmacopœial Vitamin Advisory Committee was called in New York.

At this New York meeting the International units for vitamin A and vitamin D, recommended by the League of Nations Conference, were proposed for immediate adoption by the U. S. P. X and these units were subsequently adopted by the U. S. P. Committee of Revision. This second New York Conference also recommended new vitamin standards for U. S. P. Cod Liver Oil, to be expressed in International A and D units, and also detailed assay methods for their determination. It was further recommended that there be provided for distribution to manufacturers of products having vitamin A or D potency, a "Reference Cod Liver Oil" of known vitamin A and vitamin D potency, expressed in International units, to be used in a basis of comparison in vitamin assays.

This entire plan subsequently received the approval of the U. S. P. Committee of Revision and Board of Trustees.

In the meanwhile the League of Nations Committee had arranged for the distribution to all countries interested in vitamin standardization, a limited amount of the International units, consisting of "carotene" for vitamin A and a special irradiated ergosterol for vitamin D, these having been prepared by the National Institute for Medical Research, London, England, under the supervision of Sir Henry Dale.

It was hoped at the start that the Food and Drug Administration of the Department of Agriculture at Washington would be in a position to distribute in this country both the International Vitamin units for scientific purposes, and the "Reference Cod Liver Oil," of known potency, for the standardization of commercial vitamin products; but this was found to be impracticable, so that the *Pharmacopœial Vitamin Advisory Board* was organized, with the approval of the U. S. P. Board of Trustees, for the preparation and distribution of vitamin standards within the United States. The U. S. P. Vitamin Advisory Board consists of:

Dr. Lafayette B. Mendel, Yale University, New Haven, Conn.
Dr. H. C. Sherman, Columbia University, New York, N. Y.
Dr. E. M. Nelson, Protein and Nutrition Division, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.
E. F. Kelly, Baltimore, Md., representing the U. S. P. Board of Trustees.
E. Fullerton Cook, Philadelphia, Pa., representing the U. S. P. Committee of Revision.

Plans have now been developed by this Board, which make it possible to announce at this time the following program for the *Distribution of Vitamin Standards in the United States:*

Scientific Laboratories and Research workers may obtain the International Standard Carotene, for Vitamin A, also the International Standard Irradiated Ergosterol, for Vitamin D, and the International Standard Activated Clay for Vitamin B, either through Dr. E. M. Nelson, Protein and Nutrition Division, Bureau of Chemistry and Soils, Depart-

ment of Agriculture, Washington, D. C., or through the U. S. Pharmacopœial Vitamin Advisory Board, 43rd Street and Woodland Avenue, Philadelphia.

The International vitamin standards are issued to serve only in vitamin assays. The quantities distributed are suitable only for assays with small laboratory animals such as rats, pigeons and mice.

These International vitamin standards, sent to this country by the Permanent Standard Commission of the Health Organization of the League of Nations, are issued without cost but only for scientific research.

The "Reference Cod Liver Oils" of known vitamin A or vitamin D potency, expressed in International units, will be distributed only by the U. S. Pharmacopœial Vitamin Advisory Board, 43rd Street and Woodland Avenue, Philadelphia, Pa., and are the only standards available for the use of the commercial laboratories of the United States for the standardization of products containing vitamin A and vitamin D.

The U. S. P. Vitamin Board had also assisted in securing an authentic lot of U. S. P. Cod Liver Oil, through the Bureau of Fisheries at Washington, and this oil is being packaged in 30-cc. glass containers and will be kept constantly under refrigeration. This oil will now be assayed for its vitamin A and vitamin D potency in comparison with the International Units and its vitamin activity determined by the new U. S. P. assay methods, which will be strictly followed. When this is done these "Reference Oils" will be ready for distribution for the standardization of Cod Liver Oil and other vitamin-active products.

The chairman of the Revision Committee wishes to here acknowledge the splendidly helpful coöperation rendered the Pharmacopœia by the Bureau of Chemistry and Soils and the Food and Drug Administration and by the many scientists and firms in this country and in Europe who have assisted in the development of this program. The Vitamin Committee of the American Drug Manufacturer's Association has freely contributed its records and experience in the preparation of the new assay methods, and in this final step, namely, the first standardization of the "Reference Cod Liver Oils," a large group of laboratories have volunteered their services.

Those who have already offered to conduct assays on the "Reference Oil," are:

Dr. E. V. McCollum, Johns Hopkins University, School of Hygiene and Public Health, Baltimore, Maryland

Dr. H. Steenbock of the Wisconsin Alumni Research Foundation Laboratory, Madison, Wisconsin

Dr. Walter H. Eddy, Columbia University, New York, N. Y.

Dr. Katherine H. Coward, the Pharmacological Laboratory of the British Pharmaceutical Society, London, England

Dr. E. Poulsson, of the State Vitamin Institute, Oslo, Norway.

The members of the A. D. M. A. Vitamin Committee:

Abbott Laboratories (Dr. Carl Nielsen)

Eli Lilly and Company (Dr. H. W. Rhodehamel)

Parke, Davis and Company (Dr. A. D. Emmett)

E. L. Patch Company (Dr. Arthur D. Holmes)

E. R. Squibb and Sons (Dr. John F. Anderson)

Frederick Stearns and Company (Dr. Robert L. Jones)

Also

The Health Products Corporation, through Dr. Henry T. Mason

The International Vitamin Corporation, through Dr. J. K. Marcus

The Maltine Company, through Dr. E. J. Quinn

Mead Johnson and Company, through Dr. Charles E. Bills

The Winthrop Chemical Corporation, through Dr. Charles W. Hooper.

Uniform report blanks will be supplied by the U. S. P. Vitamin Board for the use of the laboratories coöperating in the standardization of the Reference Oils. All reports will be listed under a code number and all laboratories participating will be sent all reported results.

It is expected that until the Board has secured more data on the subject of vitamin deterioration in Cod Liver Oil, the "Reference Oils" will be re-assayed each six months.

The Baltimore Drug Exchange, at its meeting of February 3rd, elected Leroy Oldham *Treasurer*, succeeding the late J. Emory Bond.

EDITORIAL NOTES

Editor: E. G. Eberle, 10 West Chase Street, Baltimore, Md.

Members of the Council, A. PH. A.: S. L. HILTON, *Chairman;* CHARLES H. LAWALL, *Vice-Chairman;* E. F. KELLY, *Secretary;* H. V. ARNY, A. G. DUMEZ, H. A. B. DUNNING, WILLIAM B. DAY, C. E. CASPARI, J. H. BEAL, T. J. BRADLEY, AMBROSE HUNSBERGER. *Ex-Officio Members:* W. BRUCE PHILIP, *President;* ROWLAND JONES, G. H. GROMMET, *Vice-Presidents;* C. W. HOLTON, *Treasurer;* E. G. EBERLE, *Editor of the Journal;* A. G. DUMEZ, *Editor of the Year Book;* J. W. SLOCUM, *Chairman of the House of Delegates.*

Collaborators: The Members of the Council; E. FULLERTON COOK, *Chairman,* U. S. P. Revision Committee; E. N. GATHERCOAL, *Chairman,* N. F. Revision Committee; Chairmen of the Sections, A. PH. A.: W. J. HUSA, W. J. RIVARD, W. PAUL BRIGGS, LEON MONELL, LOUIS GERSHENFELD, CHARLES H. STOCKING, *President,* A. A. C. P.; CHARLES B. JORDAN, *Chairman,* Executive Committee, A. A. C. P.; CLARE F. ALLEN, *President,* N. A. B. P.; HENRY C. CHRISTENSEN, *Secretary,* N. A. B. P. Scientific Section—Board of Review on Papers: *Chairman,* L. W. ROWE, Detroit, Mich.; JOHN C. KRANTZ, JR., Baltimore, Md.; F. J. BACON, Cleveland, Ohio.

DRUG NAME PRESCRIPTION REVISED BY U. S. BUREAU.

A revised list of disease names, which medicine manufacturers may not place on their labels unless the preparations have therapeutic effects which current medical opinion considers warrants the claims, has been issued by the Food and Drug Administration.

The new list differs from that of June 24, 1931, in the addition of typhoid fever, mental disturbances, jaundice, toxemia, wasting diseases, debility and "unqualified claims for use in parasitic, bacterial and fungous infestions." The list bears the revision date of November 23, 1932, but has just been distributed to the drug trade.

The revised notice follows:

It is the purpose of the Food and Drug Administration to continue vigorously its program of action under the Federal Food and Drugs Act against medicinal preparations falsely and fraudulently represented by label or circular accompanying the package as preventives or treatments for disease conditions. In determining whether therapeutic or curative claims are true or false, the administration is guided by the consensus of current medical and dental opinion as to the effectiveness of the ingredients of the product.

Extensive surveys have shown that there are still on the market many products bearing label claims which their compositions do not justify. The unwarranted claims noted have included:

Arthritis, rheumatism, gout, sciatica, joint disorders. Appendicitis, cholera morbus, cholera infantum, dysentery. Kidney and bladder disorders, albuminuria, dropsy, cystitis, nephritis, pyelitis, uremia, Bright's disease, prostrate disorders, high blood pressure. Angina pectoris, heart disease. Bone diseases. Blood poison, cancer, carbuncles, ulcers, erysipelas, scrofula, varicose veins, eczema, psoriasis. Chicken pox, mumps, measles, smallpox, meningitis, scarlet fever, typhoid fever. Chorea, St. Vitus dance, convulsions, epilepsy, hysteria, melancholia, neuralgia, nervous disorders, mental disturbances. Tonsilitis, quinsy, sore throat, diptheria, bronchitis, laryngitis, catarrh, asthma, hay fever. Female remedies, amenorrhea, ovarian and uterine diseases, menstrual disorders, vaginal diseases, leucorrhea, venereal diseases (male or female). Influenza, la grippe, pleurisy, pneumonia, sinus affections, tuberculosis. Gallstones, liver disorders, stomach ulcers, gastritis, gastro-enteritis, acidosis, jaundice, toxemia. Diabetes, wasting diseases. Goiter. Hernia. Anemia, pernicious anemia, debility, male and female rejuvenators. Pellagra. Malaria. Pyorrhea, trench mouth. Unqualified claims for use in parasitic, bacterial and fungous infections.

The responsibility under the law for compliance with its provisions rests squarely upon the manufacturer or shipper. Manufacturers whose products bear label representations for these disease conditions or for other serious maladies should carefully consider whether or not their claims are justified in the light of present scientific knowledge.

BRITISH PHARMACOPŒIAS.*

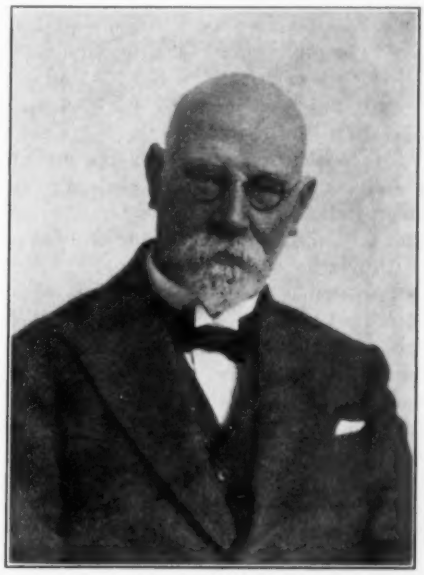
Much of the material for the pioneer pharmacopœias was derived from collections of approved or favorite prescriptions, or from manuals or recipes compiled expressly for apothecaries. The first London Pharmacopœia (1618) did not differ materially from the worst Continental models, which it had almost servilely copied. The first Edinburgh Pharmacopœia (1699) enumerated 900 simples, and included many monstrosities, of which it was gradually purged, so that in its final issue the number of efficacious drugs was reduced to 300.

The first Dublin Pharmacopœia did not appear until 1807, and in pursuance of the Medical Act of 1858 the first British Pharmacopœia, which superseded the three National Pharmacopœias, was published in 1864. Licentiates of the Society of Apothecaries had some share in the production of each National Pharmacopœia and of the first British Pharmacopœia, but chemists and druggists or the Pharmaceutical Society, if consulted at all, were referred to only to help the medical compilers out of difficulties or as an act of condescension. Nevertheless, there were already present the seminal elements of recent developments in which pharmacy has received more adequate and equitable recognition and treatment in the work of Pharmacopœial revision.

PERSONAL AND NEWS ITEMS.

Editor James P. Gilmour has retired from the editorship of the *Pharmaceutical Journal and Pharmacist*, London, the official organ of the Pharmaceutical Society of Great Britain, in his 72nd year. During a long and active career, fruitful of achievement for the advancement of his calling, Mr. Gilmour has maintained an unceasing flow of papers, lectures and reviews, no fewer than 64 standing to his credit in the last thirty years. This quite apart from his editorial work, which he has maintained at a high standard for eighteen years and not including numerous contributions on political, economic, sociological, literary and scientific subjects to various periodicals and organs of advanced thought. During those years of service and sacrifice, first in his career as a hospital dispenser—1895 to 1903—and subsequently in a pharmacy of his own in Glasgow, Mr. Gilmour maintained an active connection with his local associations, ultimately becoming chairman of the Pharmaceutical Society's executive at Edinburgh and finally a member of the Council of the Society in London, prior to his appointment as editor. The inception and putting into operation of the National Health Insurance Act of 1912 involved a vast amount of work in the interests of those chemists who undertook the work of filling prescriptions under the State.

We have enjoyed a large measure of reciprocity with the *Journal and Pharmacist;* in his issue of February 18th, Editor Gilmour published a full account of The American Institute of Pharmacy, written by Secretary E. F. Kelly. Mr. Gilmour carries with him into his well-earned retirement, happily in the best of health, the good wishes of many friends and admirers, known and unknown. Apart from his hobby of foreign travel he has many interests, among others the historiography of British pharmacy: he has advocated that a historical section should be instituted at the British Pharmaceutical Conference (which meets this year in London) corresponding to that which has been so long maintained by the AMERICAN PHARMACEUTICAL ASSOCIATION.—*Courtesy of William Mair.*



J. P. GILMOUR.

On February 3rd, Columbia University awarded medals to a group of distinguished

* From "The Origins of British Pharmacy," by J. P. Gilmour.

alumni who have rendered "conspicuous service in university and alumni affairs." Included in the number was **Dr. A. Richard Bliss, Jr.,** chief of the division of pharmacology, college of medicine, University of Tennessee, whose citation was as follows: "Distinguished educator, scientist and citizen of Memphis who has opened a new and now important sphere of Columbia influence as president of the local alumni club in his city."

Honorary President, Dean Charles F. Heebner, of Toronto, is recovering from a serious operation. We have word from him that he is making a good recovery and will soon be at his work again. Best wishes are expressed.

Prof. James H. Breasted, of the Oriental Institute, University of Chicago, sailed from New York on February 4th, for an inspection of field work in Persia.

A gift has been made by E. R. Squibb & Sons, New York, through the National Research Council Committee on Drug Addiction, of a fellowship of $700.00 for work in pharmacology to be carried on under the direction of **Prof. C. W. Edmunds,** in the Medical School of the University of Michigan.

Philadelphia College of Pharmacy and Science celebrated Founders Day on February 23rd, at which time the honorary degree of Master of Pharmacy was conferred on **Dr. George D. Beal,** of Pittsburgh. The subject of his address was "Advances in Pharmacy or Other Scientific Research." The evening at the college was featured by a testimonial banquet to **Prof. Frank X. Moerk** who is completing his fiftieth year as a member of the teaching staff at the college. He is head of the Department of Analytical Chemistry. A unique feature was the graphic problem of undergraduates in the Dramatic Society of outstanding events in Professor Moerk's career in a presentation arranged by the Registrar, John Kramer. A portrait of Professor Moerk, painted by Mrs. Mary Sturmer Jones, was presented to the college.

Prof. I. V. Stanley Stanislaus was the principal speaker before the Lackawanna County Pharmaceutical Association at Scranton, Pa., February 16th. The attendants included the presidents of the state medical, the state dental, the local medical and the local dental associations.

Professor Stanislaus spoke on the costs of medicine and showed druggists that many items they sold do not pay their proportionate share of the expenses of doing business.

Mr. and Mrs. Frederick W. Sultan announce the marriage of their daughter Isabelle to Mr. Lewis Andrew Bolin, March 4, 1933, at St. Louis, Mo.

At the annual meeting of the board of directors of the Abbott Laboratories, Inc., **S. DeWitt Clough** was elected president and general manager, succeeding the late Dr. Alfred S. Burdick.

Secretary E. F. Kelly and **President-Elect Robert L. Swain** attended the meeting and were guest-speakers at the Iowa Pharmaceutical Association. They also visited the Chicago World's Fair site and conferred with Chairman H. C. Christensen relative to the Pharmacy Exhibit, and visited Madison where Secretary Kelly discussed the coming meeting.

President John A. Goode, of the N. A. R. D., is actively at work in an effort to eliminate the sales of drugs and medicines in grocery stores.

Denny Brann delivered a Pharmacy Week Address in Des Moines, making the public better acquainted with the important duties of a pharmacist.

L. E. Warren addressed the Student Branch of Western Reserve University on Egyptian Pharmacy.

Secretary J. Lester Hayman's *Monthly Bulletin* is always interesting; that for March was largely given over to "First Aid."

Samuel S. Dworkin has mailed out a letter to manufacturers in which the position of the retail drug trade to-day is indicated and the increasing potency of the private brand method of restriction against manufacturers who do not control prices. The purpose of the communication is to create a common meeting ground on which legislation can be worked out.

The Hudson County Retail Druggists' Association is coöperating with the Hudson County Medical Society in bringing about a larger use of preparations of the U. S. P. and of the N. F. Each month official preparations are brought to the attention of physicians.

AMERICAN CONFERENCE ON HOSPITAL SERVICE.

Delegates William Gray and I. Becker attended the American Conference on Hospital Service, in Chicago. Secretary E. F. Kelly and President-Elect R. L. Swain attended one of the sessions on their way to Madison. The delegates rendered a report to President Philip, giving an account of the transactions. An interesting session was devoted to "Hospital Economics and the Costs of Medical Care."

SOCIETIES AND COLLEGES.

PAN-AMERICAN MEDICAL CONGRESS.

The fourth meeting of the Pan-American Medical Congress is in session in Dallas. **Prof. Theodore J. Bradley** has been designated a delegate and will participate as *Chairman* of the Pharmacopœial Section (English-speaking members).

Congress has authorized President Roosevelt to extend a welcome to the visitors attending the Congress.

MADISON, THE A. PH. A. CONVENTION CITY.

Secretary E. F. Kelly, of the AMERICAN PHARMACEUTICAL ASSOCIATION, and President Elect Robert L. Swain were visitors in Madison, February 17th; both were on the program of the Iowa Association and came from there to Madison. Secretary Kelly spent the day in going over the ground in Madison and talking with local committee chairmen at an evening dinner and meeting. Nearly all the members of the convention committee as well as chairmen of the various sub-committees were present.

Because of its unique situation, surrounded by four lakes, the University, and the State Capital, Madison has much to show its visitors. Many people will be interested in visiting the state, which is famous as a summer resort. The Century of Progress in Chicago will attract visitors to this section of the country.

FIRST CALL OF THE SECTION ON PRACTICAL PHARMACY AND DISPENSING FOR THE 1933 MEETING.

The officers of the Section on Practical Pharmacy and Dispensing are desirous of reaching all persons interested in the work of the section and extending to them an invitation to contribute papers for the 81st Annual Meeting to be held at Madison, Wisconsin.

The splendid program of last year was made possible by the wonderful coöperation of all interested. It is hoped to make this next series of sessions even more profitable; to this end, all titles and subjects should be forwarded to the *Secretary* as soon as possible.

W. PAUL BRIGGS,
Chairman,
2121 H. St., N. W.,
Washington, D. C.

R. E. TERRY, *Secretary*,
715 South Wood St.,
Chicago, Illinois.

NEW JERSEY BOARD.

Governor A. Harry Moore awarded certificates of registration to forty-six pharmacists at the State House, Trenton, N. J., January 31st. An address was delivered by Dr. Robert L. Swain, deputy food and drug commissioner, and secretary of the board of pharmacy of Maryland, and president-elect of the AMERICAN PHARMACEUTICAL ASSOCIATION. He stressed professional pharmacy and said that pharmacists were convinced that placing a commercial emphasis on the drug store has been a tragic error.

President C. G. McCloskey presided, and Albert J. Smith, W. Scott Taylor, Dean B. Crawford and James J. Bauman, members of the Board, took part in the exercises. Secretary Robert P. Fischelis spoke of the legal side of pharmacy.

FEDERAL WHOLESALE DRUGGISTS' ASSOCIATION.

The Federal Wholesale Druggists' Association met at the Waldorf-Astoria Hotel, New York City, March 7th–8th. There was a Conference meeting between active and associate members. President O. J. Cloughly presided and sessions were held by various divisions of the Association. Among those who participated in the various discussions were Percy C. Magnus, Ray Whidden, R. E. Lee Williamson, Jerry McQuade, Herbert R. Mayes, M. M. Sterling, Jack Norton, E. V. Frankel, Samuel L. Antonow, S. B. Penick, W. Z. Krupp, Charles L. Huisking, Turner Currens, J. J. Dreyer. Sales problems entered largely into discussions and also legislative subjects. Unity in action was urged.

MINNESOTA ASSOCIATION.

The Minnesota Pharmaceutical Association held a successful meeting. The Scientific Section was presided over by Dean Frederick J. Wulling and carried out an interesting program, which is reported on under Local Branches, page 261. The officers of the Association are: *President*, Charles A. Anderson, Litchfield; *First Vice-President*, Theodore A. Arneson, Montevideo; *Second Vice-President*, Roy G. Paulson, Fairmont; *Third Vice-President*, Barbara Piesinger, Northfield; *Secretary*, Gustav Bachman, Minneapolis;

Treasurer, Charles T. Heller, Jr., St. Paul. **Members of Executive Committee,** *Chairman*, N. Vere Sanders, Albert Lea; G. A. Thompson, St. Paul; Joseph Vadheim, Tyler; F. W. Moudry, St. Paul.

GOLDEN ANNIVERSARY OF MISSISSIPPI ASSOCIATION.

Fifty years ago, in Natchez, the Mississippi State Pharmaceutical Association held its first convention. It was a great honor for Natchez. Now we see a repetition of laurels of the same sort for the Bluff City. The Mississippi Drug Travelers, an auxiliary organization of the M. S. P. A., and only two years old, gave its first program here February 1st. in the interest of the retail drug clerks. *Secretary-Treasurer*, B. B. Key, Jackson.

BALTIMORE RETAIL DRUGGISTS' ASSOCIATION.

The Baltimore Retail Druggists' Association has elected the following officers for 1933: *President*, Aquilla Jackson; *Vice-Presidents*, W. G. Lauer, Ernest Wolf, Simon Solomon and George Grau; *Secretary*, M. Strasburger; *Treasurer*, P. J. Boenning.

Samuel Y. Harris, the retiring president, and his fellow officers were tendered a vote of thanks for the excellence of their work during the past year. President Jackson was born in Baltimore on February 16, 1896, and received his early education in the public schools of the city; later, he attended Deichman's Preparatory school and the Baltimore City college. He graduated from the School of Pharmacy, University of Maryland, in 1918. Mr. Jackson is the manager of Morgan and Millard's pharmacy.

The annual banquet of the Association on March 16th was presided over by President Jackson. Among the speakers of the delightful occasion were: Dean A. G. DuMez; *President-Elect* of the A. PH. A., Robert L. Swain; President L. M. Kantner, of the State Association; Dr. Robert H. Riley, of the State Department of Health. Lawrence S. Williams, well known for his large collection of show globes, was presented with the State cup for his Pharmacy Week window display.

TESTIMONIAL DINNER TO DR. CHARLES W. BALLARD.

The Alumni Association of the New York College of Pharmacy tendered a dinner to Dr. Charles W. Ballard on March 9th, in recognition of his completion of a quarter of a century of meritorious service to the college. The splendid affair took place at the Level Club under direction of Chairman Lewis N. Brown and a representative committee of various pharmaceutical and drug-trade organizations.

In addition to his service to pharmacy, Professor Ballard has been active in New York City public health work as it pertains to the safe-guarding of the purity of foods and drugs. He is secretary of the Section on Education and Legislation of the A. PH. A.

Dr. Ballard is Professor of Materia Medica in the College of Pharmacy, Columbia University, succeeding **Dr. H. H. Rusby** who is now *Professor emeritus*.

IOWA PHARMACEUTICAL ASSOCIATION.

Iowa Pharmaceutical Association held a successful annual meeting, largely attended. Secretary E. F. Kelly of the A. PH. A. and President-Elect Robert L. Swain were speakers of the occasion. The address of the former stressed professional pharmacy so that pharmacies may be significant of the profession. He spoke of the accomplishments of the AMERICAN PHARMACEUTICAL ASSOCIATION and its present activities in promoting the service of pharmacy. He acquainted the members with the progress being made in the headquarters building, its aims and purposes. The President-Elect discussed legal phases and the importance of supporting and furthering the standards of professional pharmacy, so that its place as a public health service may be fully understood by the public.

The following are the officers for the ensuing year: *President*, Olin E. Hill, Clinton; *First Vice-President*, Otto Bjornstad, Spencer; *Second Vice-President*, L. R. Henderson, Muscatine; *Third Vice-President*, L. R. Sidmore, Manson; *Treasurer*, J. M. Lindly, Winfield.

Iowa Past Presidents' Club was presided over by President John Heerema. Resolutions in memory of the late Secretary Al Falkenheimer were drafted. J. W. Slocum was elected secretary of the club. Twelve former secretaries were present, E. L. Beazley is president for this year.

NORTHWESTERN PHARMACEUTICAL BUREAU.

The officers of the Northwestern Pharmaceutical Bureau are: *President*, John P. Jelinek, St. Paul; *Vice-President*, Joseph Vadheim,

Tyler, Minn.; P. H. Costello, Cooperstown, N. Dak.; Otto J. Tommeraason, Madison, S. Dak.; *Secretary*, Rowland Jones, Jr., Gettysburg, S. Dak.; *Treasurer*, R. M. Gibson, Des Moines. *Executive Committee: Chairman*, N. Vere Sanders, Albert Lea, Minn.; Paul J. Jepson, Newton, Ia.; John Veenker, Northwood, Ia.; Edward Seiberlich, St. Paul. The Bureau organized twelve years ago to promote the interests of the drug trade in the Northwest, was co-sponser of the Drug Show along with the Iowa Pharmaceutical Association and the Polk County Druggists' Association and was, as in past years, very successful.

AMERICAN DRUGGISTS' FIRE INSURANCE COMPANY MEETING.

The annual meeting of the American Druggists' Fire Insurance Company was held February 14th and 15th; the report rendered presented most satisfactory results. H. M. Lerou of Norwich, Conn., and John H. Weisel, of Monroe, Mich., were elected to fill vacancies. Other directors were reëlected, they are: Charles H. Avery, James H. Beal, William C. Anderson, G. O. Young, J. S. Rutledge, Walter Rothwell, Frank H. Freericks, Edward Stucky, E. H. Thiesing, Edward Voss, Jr., Samuel C. Davis, M. S. Kahn, E. B. Heimstreet; the first seven constitute the Executive Committee. The officers of the Company are: *President*, Charles H. Avery; *Vice-President*, James H. Beal; *Secretary and General Manager*, Frank H. Freericks; *Treasurer*, Walter Rothwell; *Assistant Secretary*, W. P. Starkey; *Assistant Treasurer*, E. H. Thiesing. The annual dinner was an enjoyable affair.

OBITUARY.

ROBERT MCNEIL.

Robert McNeil, founder of the pharmaceutical manufacturing business bearing his name and widely known throughout the industry, died unexpectedly of a heart attack February 12th, at his home in Germantown, Philadelphia. He was seventy-seven years old and had been apparently in good health until Sunday when he was informed of the death of Dr. Alfred S. Burdick, head of the Abbott Laboratories, Chicago, who was an old friend and fellow-worker in the industry. About one hour after hearing of Dr. Burdick's death, Mr. McNeil was stricken and died within a few minutes.

Mr. McNeil graduated from the Philadelphia College of Pharmacy and Science in 1876, and, in 1879, founded the pharmaceutical manufacturing business which of recent years has been conducted by his son, Robert Lincoln McNeil. He was a director of the Kensington Board of Trade and the Kensington Bank and Trust Company, both of Philadelphia.

Referring to Mr. McNeil, Charles Wesley Dunn, general counsel of the American Pharmaceutical Manufacturers' Association, with which Mr. McNeil had long been associated, issued a statement to the membership in which he said that Mr. McNeil was a man of lovable personality and a manufacturer of the highest ideals. Mr. McNeil had been a member of the AMERICAN PHARMACEUTICAL ASSOCIATION for more than 25 years.

Funeral services were held February 16th, at the home of his son, Robert Lincoln McNeil, in Germantown. The relationship of father and son was enhanced, if possible, by the attachment of one for the other. His survivors include his wife and son and the latter's two boys, to whom sympathy is expressed. Most of the foregoing data have been taken from the *Oil, Paint and Drug Reporter*.

DR. MARTIN L. PORTER.

In the passing of Dr. M. L. Porter of Danforth, the Maine Pharmaceutical Association and the AMERICAN PHARMACEUTICAL ASSOCIATION sustained a great loss. He possessed the unique record of having attended every annual meeting of the former association during the past forty years; served as its secretary twenty-seven consecutive years, was then elected president; thereafter he became treasurer of the Association. His circle of acquaintance among members of the drug trade of Maine was probably broader than that of any other man, and his good fellowship and genial cordiality endeared him to all. The deceased was born in Dixmont, Maine, 74 years ago; after his preliminary education he took up the study of medicine and graduated from the University of Vermont, in 1880, and entered practice in Danforth. He passed the examination as registered pharmacist in 1891, and since then conducted the Danforth Drug Store.

Dr. Porter was much interested in civic

affairs and fraternal organizations. He was married in 1879 to Miss Annie Crabtree, who died in 1915.

The death of Dr. Malcolm Evan MacGregor, who has been in charge of the Wellcome Entomological Field Laboratories, has been reported. He came into prominence in the War and studied mosquitoes with a view to solving some of the fundamental problems underlying their mode of life. He wrote numerous scientific papers and a handbook for antimalarial workers, entitled, "Mosquito Surveys."

LEGAL AND LEGISLATIVE.

A CORRECTION LONG DEFERRED.

The dispensing of alcoholic liquors by pharmacists is an obligation they did not seek but accepted as a duty, because certain alcoholic liquors are recognized therapeutic agents. Pharmacists should never have been designated retail liquor dealers; H. R. 12843 by Congressman McCormick has been favorably reported to the House without amendment, changing the name of the retail liquor dealers stamp tax, applying to pharmacists. The House Committee on Rules has reported a rule on the bill which should assure its early consideration.

STATE LEGISLATION.

Connecticut seeks to amend provisions of the Pharmacy Act, authorizing the Commission to license persons, not registered pharmacists, to sell in stores not registered pharmacies, certain drugs. Idaho and several other states are considering regulations applying to possession and sale of peyote. Indiana and a number of other states propose to restrict the sale of hypnotics, labeling them "poison," etc.; in some states acetanilid is included. The New York State Board of Pharmacy has approved a rule that no certificate of registration for the conduct of a pharmacy shall be issued or continued unless the premises are properly equipped with sanitary appliances and kept in a clean and orderly manner. Texas H. B. 627 proposes to make it unlawful for any pharmacy to distribute at retail or wholesale tobaccos, hardware, jewelery and all other articles except drugs and medicines. West Virginia proposes annual registration of pharmacies; to have in all pharmacies the latest editions of U. S. P. and N. F. Oregon seeks to prohibit dispensing of drugs by vending machines.

Secretary Rowland Jones reports the sessions of South Dakota closed and that very good work has been done by preventing undesirable legislation bearing on pharmacy and drug business.

Secretary Robert C. Wilson advises that Georgia has a new pharmacy law, which requires graduation prerequisite for Board examination. It is hoped to have two pharmacists on the Board of Health.

The Baltimore and Maryland pharmaceutical and drug-trade activities took prompt favorable action in approving the resolution embodied in Council Letter No. 7, published in this issue of the JOURNAL.

Bulletin No. 7 of the AMERICAN PHARMACEUTICAL ASSOCIATION urges pharmaceutical associations to study the editorial of the January JOURNAL, and—if committees or councils as proposed in Recommendation No. 4 are formed—to see that pharmacy is properly represented.

On February 8th, Judge Edward J. Glennon of the New York Supreme Court ruled that a licensed druggist shall be entitled to own and conduct a pharmacy and also, that he may work independently in a pharmacy in New York City.

Counterfeiting packages and labels of nationally known products, particularly medicines and cosmetics, is to be attacked from a new angle by the National Purchasers Protective Association, with headquarters at 51 Chambers Street, New York, which purposes to publish and distribute information and warnings designed to put the public on guard against counterfeit products.

"Where the evidence, in an action against a drug company for injuries resulting from the filling of a prescription with a compound not indicated by the prescription, showed that the clerk who filled the prescription had graduated in pharmacy only a few weeks before the time in question, and that, while he had passed the examination as a registered assistant pharmacist, he had not yet passed the examination required by statute to entitle him to be registered as a pharmacist, the jury was warranted in finding that he was not a competent pharmacist.—Jones *vs.* Walgreen Co.,

265 III. App. 308"—*Courtesy W. Bruce Philip.*

Bulletin of the University of Mississippi, series XXX, No. 3, 48 pages. Mississippi's General Sales Tax—how it works. The conclusions are that it is efficient as a revenue producer, has justified itself, at least as an emergency measure.

BOOK NOTICES AND REVIEWS.

A Textbook of Pharmaceutics. By ARTHUR OWEN BENTLEY, Ph.C., Head of the School of Pharmacy and Senior Lecturer in Pharmaceutics, University College, Nottingham; joint author of a "Textbook of Pharmaceutical Chemistry; author of "Aids to Dispensing," third edition, 1933, revised and enlarged. Demmy, 8 vol., pp. xii + 926, with appendix and 234 illustrations. Price 15s. net. Postage Inland 9d; U. S. 1s. Publishers, Baillière, Tindall and Cox, 7 x 8 Henrietta Street, Convent Garden, London, W.C. 2.

The author states that this book covers the requirements in pharmaceutics of the syllabuses of the Pharmaceutical Society of Great Britain, the University of London, and of the Pharmaceutical Societies and Boards of the British Empire. Privilege has been granted for using certain portions of the British Pharmacopœia and of the British Pharmaceutical Codex.

Part I of this book deals with the history of pharmaceutics in Great Britain; reference is made to an interesting account of the early history in a paper by Editor J. P. Gilmour on "The Origins of British Pharmacy," in the *Pharmaceutical Journal*, for September 17, 1932. Pharmacy is described under the following subjects: Pharmacognosy, Pharmaceutical Chemistry, Forensic Pharmacy and Pharmaceutics. It is stated that the latter subject deals with the preparation, from biological or chemical sources, of materials in a convenient form for use as medicines, and with the preparing of medicines in a form suitable for administration or application. The subject is subdivided for purposes of study into four sections—History of Pharmaceutics, General Principles and Apparatus, Dispensing of Medicines, Pharmaceutical Preparations.

Part V deals with Pharmaceutical Biology and the Appendix includes tables of doses and of solubilities. The sections or parts are discussed in 86 chapters:

Part I has 36 pages devoted to history of pharmaceutics, 1511–1841, from there on to the history of the Pharmaceutical Society of Great Britain, 1841–1932, and the history of the British Pharmacopœia.

Under Weights and Measures, the Imperial System, Avoirdupois Weight, Apothecaries Weight, and the Metric System are considered. A distinction is recorded between dram and drachm—the former is stated "to be $^1/_{16}$ part of the avoirdupois ounce and should not be confused with drachm, which is the $^1/_8$ part of the apothecaries ounce." The Imperial standard gallon weighs 10 lb., the equal of 70,000 grains; there are 20 fluidounces in a pint. In the Metric System, the French spelling is followed, *i. e.*, "litre," "metre." In giving weight values Kilogram is spelled with a cap K (page 62), but dekagram is spelt with l. c. d. It is further stated that gramme is spelled thus instead of "gram" to avoid confusion with "grain" in writing, and should be abbreviated "G." Seemingly there is considerable confusion; furthermore, in explaining measures of capacity the terms mil, centimil and decimil are given. Also in an article following (page 63) abbreviation gm. and not G. is used.

A matter worthy of favorable comment is the giving of tolerances in weights and measures, but there seems (?) to be irregularity in graduation, for example, in a 10-ounce weight the excess allowed is 0.7 grain and in a 1-ounce weight, 0.2 grain. In measures with internal diameters (approx.) at graduation tested, the excess or deficiency allowed is: 4 inches—25 minims; 2 inches—11 minims; 1 inch—4 minims. It seems to the writer that the tolerances are not sufficient to safeguard the pharmacist.

The chapter or sources of heat have been brought up-to-date for the retail pharmacist; that dealing with "Solutions" and the one on "Decantation and Filtration," that on "Osmotic Pressure," and the one "Emulsions" deserve favorable mention. Considerable additional matter has been embodied in the revisions of the chapters on "Distillation" and "Percolation."

The chapters on "Dispensing" and "Pharmaceutical Preparations" will prove helpful. The tables of "Doses and Solubilities" are published in an appendix of the volume, which may be removed from the book, if desired, and used on the prescription desk for convenience.

The volume of which mention is made has been prepared for British pharmacists and students, but will frequently serve a good purpose for American pharmacists.

Alcohol and Man—The Effects of Alcohol on Man in Health and Disease. By HAVEN EMERSON, M.D., Editor, DeLamar Institute of Public Health, Columbia University. The MacMillan Company, New York City, 1932. Pages xi + 451, 15 x 24 cm. Price $3.50.

In conjunction with several associate editors and specialists in various branches of pharmacology, physiology, sociology and psychiatry, the editor has produced a comprehensive and authoritative symposium embracing the present knowledge of alcohol.

The work is divided into six parts. Each of these divisions has further subheadings contributed by various specialists. The six major divisions of the treatise are:

1. The Effects of Alcohol on Human Functions.
2. The Effects of Alcohol on the Cell and in Heredity.
3. Alcohol as a Poison and a Medicine.
4. Alcohol and Body Resistance and Pathology.
5. Effect of Alcohol on Man's Conduct and Mentality.
6. Alcohol and Longevity, Mortality and Morbidity.

In the various chapters of the book vital and perplexing questions such as the influence of alcohol upon offspring are discussed from a physiological, pharmacological and statistical standpoint. Alcohol and the Overton-Meyer theory of narcosis is elaborated on. The classical experiments of Stockard concerning the influence of alcohol vapor on guinea pigs in successive generations are developed and discussed by the experimenter himself.

The references to the literature are embracive. The book is absolutely devoid of any prejudice or social influence that so often colors works on alcohol.

The style is clear and concise, and in the mind of the reviewer the volume bids fair to stand for years as the authoritative treatise on this subject.—JOHN C. KRANTZ, JR.

Man and Medicine.—In the following, liberty is taken in quoting the *New Republic:*

"The recent establishment at Johns Hopkins of a school devoted to the history of medicine may prove to be an event of much or of little significance. It depends upon the breadth or narrowness of the conception of medicine and upon how extended and adventurous is the search for the elements of its history. Whether the school proves to be a center of creative work, a shop for the manufacture of documented erudition or just another excursion into futility must depend upon its personnel. A few weeks ago Henry E. Sigerist came from Leipzig to lead the new venture, and if his recently published 'Man and Medicine' is prophetic evidence, his subject bids fair to be numbered among the humanities.

"The trouble with most books on the history of medicine is that they have little interest for persons who are not interested in medicine. The better ones are competent, technical, but overwhelming, treatises addressed by the professional to members of his craft. The occasional excursions into popular discussion play for interest by using colorful and irrelevant biographical material or by dramatizing significant discoveries. But whether professional or popular, they all stage the search for truth as a triumphal march ending in a hallelujah chorus. One and all, they deal with the development of medicine as a thing apart from prevailing opinion and the vulgar course of human events."

"It is an unconsciousness of its kind which gives distinction to Sigerist's book and augurs well for the enterprise at Hopkins. To him medicine is an aspect of the development of culture, a product of the successive ways of the mind in research, a reflection of the spirit of the many ages through which it has passed. In the imperfect and sprawling lines of its contemporary pattern, it is the creature of the need, thought and circumstance it has met."

Nos Plantes Medicinales de France. Another set of these beautiful cards has been published; there are eight cards in the set—7½ by 5¼ inches and the price of the set is three francs. Address your order to L'Office National des Matières Premières, 12, Avenue du Marne, Paris. The illustrations depict the plants or parts of them with remarkable resemblance enabling one to recognize the plant in nature. The backs of the cards give information relative to the plant, its botany, pharmacognosy, uses and names of plants in a number of languages—French, English, German, Italian, Spanish. Chart 81 illustrates the cork-tree, method of gathering the bark, the leaves, flower and fruit, and explains its uses. Illustration 82 relates to the willow; 83 presents Provence rose; 84, blackberry; 85, shepherd's purse; 86, mistletoe; 87. sage; 88, periwinkle.